

S J P N Trust's

Hirasugar Institute of Technology, Nidasoshi.

Inculcating Values, Promoting Prosperity

Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi

Recognized under 2(f) & 12B of UGC Act, 1956

Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE&ECE

First Year Engg.

Academics

Course Plan

AY:2022-23 (Even)



***First year Engineering
Course Plan 2022-23 Even Semester
(Physics group)***

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INSTITUTE VISION

To be a preferred institution in Engineering Education by achieving excellence in teaching and research and to remain as a source of pride for its commitment to holistic development of individual and society.

INSTITUTE MISSION

To continuously strive for the overall development of students by educating them in a state-of-the-art-infrastructure, by retaining the best practices, people and inspire them to imbibe real time problem solving skills, leadership qualities, human values and societal commitments, so that they emerge as competent professionals.

PROGRAMME OUTCOMES (POs)

Nidasoshi-591 236, Tq.: Hukkeri, Dist.: Belagavi, Karnataka, India.
 Phone: +91-8333-278887, Fax: 278886, Web: www.hsit.ac.in, E-mail: principal@hsit.ac.in

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1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological

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7.	Theory – Course Plans and Question Bank BMATE201 - Mathematics for Electrical Engineering BMATM201 - Mathematics for Mechanical Engineering BMATC201 - Mathematics for Civil Engineering BPHYE202 - Physics for Electrical Engineering BPHYM202 - Physics for Mechanical Engineering BPHYC202 - Physics for Civil Engineering BEEE203 - Elements of Electrical Engineering BEME203 – Elements of Mechanical Engineering BCIVC203- Engineer Mechanics BESCK204B - Introduction to Electrical Engineering BESCK204E - Introduction to C programming BPLCK205B - Introduction to Python programming BETCK205E - Renewable Energy Sources BPWSK206- Professional Writing Skills in English BICOK207- Indian Constitution BSFHK258 – Scientific Foundation of Health	

STUDENT HELP DESK

Sl. No	Purpose	Contact Person	
		Faculty	Instructor
1	Attestations	Dr. K. B. Manwade	--
2	Time table	Prof. V.M. Bhumannavar	--
3	I.A. Test Coordinator and EMS Coordinator (Online submission of exam form / revaluation form to VTU)	Dr. S. J. Walki	Mrs. S.S. Kankanwadi Mr. G. B. Dodagoudar
4	Students' Counseling & Discussion with parents	Dr. M.S. Hanagadakar Prof. V.M. Bhumannavar	--
5	Extra-Curricular & Co- Curricular Activities	Dr. S. L. Patil	Mrs. S.S. Kankanwadi Mr. G. B. Dodagoudar
7	Dispensary	Dr. Arun. G. Bullannavar Cell No.9449141549	
8	First Year Information	Dr. K. B. Manwade First Year Coordinator Mobile No: 8412968254 E-mail ID-hod.1yr@hsit.ac.in	

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DEPARTMENTAL RESOURCE FACULTY POSITION

S.N.	Category	No. in position	Average experience
1	Teaching faculty	13	17
2	Technical supporting staff	01	18
3	Helper	01	18

MAJOR LABORATORIES

S.N.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested (Rs.)
1.	Engg. Chemistry Lab	200	13,83,479.00
2.	C programming Lab	200	18,75,652.00
Total Investment in the Department			31,96,783.00

TEACHING FACULTY DETAILS

S.N.	Name	Designation	Qualification	Specialization	Teaching Exp. (In yrs.)	Phone No.
1.	Dr. B. V. Madiggond	Prof. & HOD	M.Tech .Ph.D	Power Electronics	29	9343454993
2.	Dr. K. M. Akkoli	Asso.Prof.	M.Tech .Ph.D	Thermal Power Engineering	20	9739114856
3.	Dr. M. S. Hanagadakar	Asso. Prof.	M.Sc. Ph.D	Physical Chemistry	18	8310768223
4.	Prof. S.V. Manjaragi	Asst. Prof.	M.Tech .	Computer Science Engg.	18	998665309
5.	Dr. S. L. Patil	Asst.Prof.	M.Sc. Ph.D	Graph Theory	13	8867664082
6.	Dr. S. J. Walki	Asst. Prof.	M.Sc. Ph.D	Organic Chemistry	06	8105787069
7.	Prof. S. D. Hirekodi	Asst. Prof	M.Tech .	Power Electronics	23	8073543248
8.	Prof. V. M. Bhumannavar	Asst. Prof.	M.Sc. (Ph.D)	Physics	17	9448526988
9.	Prof. S. S. Malaj	Asst. Prof.	M.Tech	Electronics & Telecommunication	24	8073529095
10.	Prof. D. B. Madihalli	Asst. Prof.	M.Tech .	Industrial Electronics	16	9902854324
11.	Prof. M. S. Futane	Asst. Prof.	M.Tech	CIM	17	9164105035
12.	Prof. S.S. Patil	Asst.Prof.	M.Tech	VLSI Design & Embedded Systems	18	9448102010
13.	Prof. S. A. Patil	Asst. Prof.	M.Sc.	Mathematics	10	9945800869
14.	Prof. S. S. Thabaj	Asst. Prof.	M.Sc.	Mathematics	10	9901398134
15.	Prof. A. U. Nesthi	Asst.Prof.	M.Tech	Digital Electronics	15	9606703174
16.	Prof. P. I. Savadatti	Asst.Prof.	M.Tech	Digital Electronics	7	9964315436
17.	Prof. P.R. Patil	Asst.Prof.	M.Tech	Structural Engineering	4	9606557280
18.	Prof. S. B. Radder	Asst.Prof.	M.Sc	Spectroscopy	5	8431653560
19.	Prof. B. S. Hooli	Lecturer	M.A	English	20	9353476479



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Visvesvaraya Technological University, Belagavi

Scheme of Teaching and Examinations-2022

Outcome-Based Education(OBE)and Choice Based Credit System(CBCS)

(Effective from the academic year 2022-23)

II Semester (Electrical & Electronics Engineering Stream) (For students who attended 1 st semester under Chemistry Group)													
Sl No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	GE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	*ASC(IC)	BMATE201	Mathematics for EES-II	Maths	2	2	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYE202	Physics for EES	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEEE203	# Elements of Electrical Engineering	EEE/ECE/TCE	2	2	0	0	03	50	50	100	03
		OR											
		BBEE203	## Basic Electronics		3	0	0	0					
4	ESC-II	BESCK204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK205x	Programming language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK205x	Emerging Technology Course-II		3	0	0	0					
6	AEC	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMC	BKSKK207/ BKBKK207	Sanskritika Kannada/ Balake Kannada	Humanities	1	0	0	0	01	50	50	100	01
		OR											
		BICOK207	Indian Constitution		1	0	0	0					
8	AEC/SDC	BIDTK258	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		OR											
		BSFHK258	Scientific Foundations of Health		1	0	0	0					
TOTAL										400	400	800	20

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Visvesvaraya Technological University, Belagavi Scheme of Teaching and Examinations-2022 Outcome-Based Education(OBE)and Choice Based Credit System(CBCS) (Effective from the academic year 2022-23)													
II Semester (Mechanical Engineering Stream)						(For the students who have attended 1semester under Chemistry Group)							
Sl No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory Lecture	Tutorial	Practicaly Drawing	SIA	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	*ASC(IC)	BMATM201	Mathematics for ME Streams-II	Maths	3	0	2	0	03	50	50	100	04
2	#ASC(IC)	BPHYM202	Physics for ME Streams	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BEME203	Elements of Mechanical Engineering	Mechanical	2	2	0	0	03	50	50	100	03
4	ESC-II	BESCK204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	OR												
	ETC-II	BETCK205x	Emerging Technology Course-II		3	0	0	0	03				
6	AEC	BPWSK206	Professional Writing Skills in English	Humanities	0	2	0	0	01	50	50	100	01
7	HSMC	BKSKK207	Samkrutika Kannada/ Balake Kannada	Humanities	0	2	0	0	01	50	50	100	01
		BKBKK207											
		BICOK207	Indian Constitution										
8	AEC/SDC	BIDTK258	Innovation and Design Thinking	Any Dept	0	0	2	0	02	50	50	100	01
		OR											
		BSFHK258	Scientific Foundations of Health		1	0	0	0	01				
TOTAL										400	400	800	20

SDA-Skill Development Activities, TD/PSB- Teaching Department / Paper Setting Board, ASC-Applied Science Course, ESC- Engineering Science Courses, ETC- Emerging



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Visvesvaraya Technological University, Belagavi Scheme of Teaching and Examinations-2022 Outcome-Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from the academic year 2022-23)													
II Semester (Civil Engineering Stream)						(For the students who attended I semester under Chemistry Group)							
Sl No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	SIM	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	*ASC (IC)	BMATC201	Mathematics for Civil Engineering-II	Maths	2	2	2	0	03	50	50	100	04
2	#ASC (IC)	BPHYC202	Physics for Civil Engineering	PHY	2	2	2	0	03	50	50	100	04
3	ESC	BCIVC203	Engineering Mechanics	Civil Engineering Dept	2	2	0	0	03	50	50	100	03
4	ESC-II	BESCK204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	0	03	50	50	100	03
5	PLC-II	BPLCK205x	Programming Language Course-II	Any Dept	2	0	2	0	03	50	50	100	03
	ETC-II	BETCK205x	Emerging Technology Course-II		3	0	0	0					
6	AEC	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	0	01	50	50	100	01
7	HSMC	BKSKK207	Sanskritika Kannada/ Balaka	Humanities	1	0	0	0	01	50	50	100	01
		BKBKK207	Kannada										
		BICOK207	Indian Constitution										
8	AEC/SDC	BIDTK258	Innovation and Design Thinking	Any Dept	1	0	0	0	01	50	50	100	01
		BSFHK258	Scientific Foundations of Health		1	0	0	0					
TOTAL										400	400	800	20

SDA-Skill Development Activities, TD/PSB- Teaching Department / Paper Setting Board, ASC-Applied Science Course, ESC- Engineering Science Courses, ETC- Emerging Technology Course, AEC- Ability Enhancement Course, HSMS-Humanity and Social Science and management Course, SDC- Skill Development Course, CIE – Continuous Internal Evaluation, SEE- Semester End Examination, IC - Integrated Course (Theory Course Integrated with Practical Course)

BMATC201 Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers. **The mathematics subject should be taught by single faculty member per division, with no sharing of the course(subject) module-wise by different faculty

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Subject Title	Mathematics-II for Electrical & Electronics Engineering Stream		
Subject Code	BMATE201	IA Marks	50
Number of Lecture Hrs / Week	04	Exam Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03
CREDITS – 04			

FACULTY DETAILS:		
Name: 1) Dr. S L Patil 2) Prof. S S Thabaj	Designation 1) Asst.Prof. 2) Asst.Prof.	Experience: 1) 13.9 years 2) 09 years
No. of times course taught 1) 01 (including present) 2) 01	Specialization: Mathematics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	First Year Engineering	I	Calculus and Linear Algebra

2.0 Course Objectives


This course viz., Advanced Calculus and Numerical Methods aims to prepare the students:

- **Familiarize** the importance of Integral calculus and Vector calculus essential for electronics
- **Analyze** electronics and electrical engineering problems by applying Partial Differential Equations.
- **Develop** the knowledge of solving electronics and electrical engineering problems numerically.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to

	Refined Course Outcome	Cognitive Level	POs
C201.1	Understand the applications of vector calculus refer to Solenoidal, irrotational vectors, line integral and surface integral.	L1, L2,L3	1,2,4,12
C201.2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation	L1, L2,L3	1,2,4,12
C201.3	To understand the concept of Laplace transform and to solve initial value problems.	L1, L2,L3	1,2,4,12
C201.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.	L1, L2,L3	1,2,4,12
C201.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB	L1, L2,L3	1,2,4,12

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4.0 Course Content

Module – 1

Introduction to Vector Calculus in EC & EE Engineering Applications.

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, Solenoidal and irrotational vector fields and problems.

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stokes theorem. Problems. **(RBTL: L1, L2 and L3) (8 Hours)**

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.

Module – 2

Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.

Vector spaces: Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis and dimension.

Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality. **(RBTL: L1, L2 and L3) (8 Hours)**

Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.

Applications: Image processing, AI & ML, Graphs and networks, computer graphics.

Module – 3

Importance of Laplace Transform for EC & EE engineering applications.

Existence and Uniqueness of Laplace transform (LT), transform of elementary functions, region of convergence, Properties—Linearity, Scaling, t-shift property, s-domain shift, differentiation in the s-domain, division by t, differentiation and integration in the time domain, LT of special functions periodic functions (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Unit impulse function.

Inverse Laplace Transforms:

Definition, properties, evaluation using different methods, convolution theorem (without proof), problems, and Applications to solve ordinary differential equations. **(RBTL: L1, L2 and L3) (8 Hours)**

Self-Study: Verification of convolution theorem.

Applications: Signals and systems, Control systems, LR, CR & LCR circuits.

Module –4

Importance of numerical methods for discrete data in the field of EC & EE engineering applications.

Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.

Self-Study: Bisection method, Lagrange's inverse Interpolation, Weddle's rule.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area.


(RBTL: L1, L2 and L3) (8 Hours)

Module –5

Introduction to various numerical techniques for handling EC & EE applications.

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Numerical Solution of Ordinary Differential Equations (ODEs):

Numerical solution of ordinary differential equations of first order and first degree - Taylors series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector formula (No derivations of formulae), Problems. **(RBTL: L1, L2 and L3) (8 Hours)**

Self-Study: Adam-Bashforth method.

Applications: Estimating the approximate solutions of ODE for electric circuits.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	III and IV	Electrical and Electronics Engineering stream	Signals and systems, Control systems, LR, CR & LCR circuits, Electrostatics, Analysis of streamlines and electric potentials, Image processing, AI & ML, Graphs and networks, Computer graphics

6.0 Relevance to Real World


Sl. No	Real World Mapping
01	Vector calculus is used in electromagnetic fields, gravitational fields, and fluid flow. Vector integration is used in Electromagnetic field, Gravitational field, fluid flow.
02	Image processing, AI & ML, Graphs and networks, computer graphics.
03	Laplace transform are used in various areas of physics, electrical engineering, control engineering, optics, mathematics and signal processing. Laplace Transform is widely used by electronic engineers to solve quickly differential equations occurring in the analysis of electronic circuits
04	Estimating the approximate roots, extremum values, Area, volume, and surface area.
05	Numerical Methods are used in all fields of engineering and the physical sciences, life sciences, social sciences, medicine, business and even the arts have adopted elements of scientific computations.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Integrals

8.0 Books Used and Recommended to Students

Text Books
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. (Reprint), 2018.
Reference Books
1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, Latest edition 10th Ed., 2022..
2. B.V.Ramana: "Higher Engineering Mathematics" 11 th Edition, Tata McGraw-Hill, 11 th Ed, 2017
3. H. K. Dass and Er. Rajnish Verma: "Higher Engineerig Mathematics", S. Chand publishing, 3 rd edition, 2014.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics", McGraw – Hill
5. James Stewart: "Calculus" Cengage publications, 7th edition, 2019.
6. Srimanta Pal & Subobh C Bhunnia: "Engineering Mathematics", Oxford University Press, 3 rd Reprint, 2016.

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7. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for I & II ", McGraw-Hill Education (India) Pvt. Ltd., 2015.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

Additional Study material & e-Books

1. CRC Standard Mathematical Tables and Formulae, 32nd Edition
2. A Student's Guide to the Study, Practice, and Tools of Modern Mathematics- Bindner, Donald
3. P.N.Wartikar & J.N.Wartikar -Applied Mathematics (Volume I & II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994.
4. Peter V.O'Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
5. Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.

9.0

Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. <http://www.khanacademy.org/>
3. (MOOCs)
4. <http://academicearth.org/>
5. VTU EDUSAT Program
6. VTU e-Shikshana Program

10.0

Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
	+ Plus Magazine	https://plus.maths.org/issue44.
	Mathematics Magazine	www.mathematicsmagazine.com

11.0

Examination Note

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester


Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

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(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:


Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	Scalar and vector fields	20
	2	Gradient, directional derivatives	
	3	Curl and divergence-physical interpretation	
	4	Solenoidal and Irrotational vector fields	
	5	Line integrals	
	6	Green Theorem	
	7	Stokes Theorem	
	8	Applications to work done by a force and flux	
2	9	Definition and examples, subspace, linear span	20
	10	Linearly independent and dependent sets	
	11	Basis and dimension	
	12	Linear transformations: Definition and examples	
	13	Algebra of transformations, Matrix of a linear transformation. Change of coordinates	
	14	Rank and nullity of a linear operator	
	15	Rank-Nullity theorem	
	16	Inner product spaces and orthogonality	
3	17	Existence and Uniqueness of Laplace transform (LT)	20
	18	transform of elementary functions, region of convergence	
	19	Properties–Linearity, Scaling, t-shift property, s-domain shift	
	20	differentiation in the s-domain, division by t, differentiation and integration in the time domain	
	21	LT of special functions periodic functions	
	22	Heaviside Unit step function, Unit impulse function.	
	23	Inverse Laplace Transforms: Definition, properties, evaluation using different methods	
	24	Convolution theorem (without proof), problems, and Applications to solve ordinary differential equations.	
4	25	Solution of polynomial and transcendental equations	
	26	Finite differences: Forward & backward differences	
	27	Newton's forward and backward interpolation formulae	
	28	Problems	

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	29	Divided differences- Newton's divided difference formula	20
	30	Lagrange's interpolation	
	31	Numerical integration: Simpson's one third rule	
	32	Simpson's three eighth rule	
5	33	Numerical solution of ODE of first order & first degree	20
	34	Taylor's series method & Problems.	
	35	Modified Euler's method & Problems	
	36	Problems	
	37	Runge -Kutta method of fourth order & Problems	
	38	Problems	
	39	Milne's predictor and corrector method	
	40	Problems	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1&2 of the syllabus	6	Individual Activity.	Book 1, of the reference list. Website of the Reference list
2	Assignment 2: University Questions	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 3,4 & 5 of the syllabus	11	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list

14.0 QUESTION BANK

Module-1:

- Find $\text{div } F$ & $\text{curl } F$ if $F = \nabla (x^3 + y^3 + z^3 - 3xyz)$
- If $\phi = x^2 + y^2 + z^2$ and $\vec{F} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$, then find $\text{grad } \phi$, $\text{div } \vec{F}$ and $\text{curl } \vec{F}$
- Find the value of the constants a, b & c such that the vector field, $\vec{F} = (x + y + az)\hat{i} + (bx + 2y - z)\hat{j} + (x + cy + 2z)\hat{k}$ is irrotational and hence find a scalar
- If $u = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ & $v = yz\hat{i} + xz\hat{j} + yx\hat{k}$ then prove that $\vec{u} \times \vec{v}$ is a Solenoidal vector
- Prove that $\text{div}(\phi\vec{A}) = \phi(\text{div } \vec{A}) + \text{grad } \phi \cdot \vec{A}$
- Prove that $\text{curl}(\text{grad } \phi) = 0$
- Prove that $\text{div } \text{curl } F = \nabla \cdot \nabla \times F = 0$
- If $u = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$ & $v = yz\hat{i} + xz\hat{j} + yx\hat{k}$ then prove that $\vec{u} \times \vec{v}$ is a Solenoidal vector
- If $\vec{v} = \vec{w} \times \vec{r}$, prove that $\text{curl } \vec{v} = 2\vec{w}$ where \vec{w} is a constant vector
- Verify the Greens theorem $\oint_c (xy + y^2)dx + x^2dy$ where c is the closed curve of the region bounded by $y = x$ and $y = x^2$
- Find the area between the parabola $y^2 = 4x$ and $x^2 = 4y$ with the help of Greens theorem in a plane.
- Verify the Stroke's theorem for the vector function $\vec{F} = 2xy\hat{i} + (x^2 - y^2)\hat{j}$ over the circle $x^2 + y^2 = 1, z = 0$
- Evaluate $\int_c xy \, dx + xy^2 \, dy$. by Stroke's theorem where c is the square in x y-plane with (1, 0), (-1, 0), (0,1) & (0, -1)



Module-2:

1. The set w of ordered triads $(a_1, a_2, 0)$, $a_1, a_2 \in F$ is a subspace of $v_3(F)$
2. Prove that the set of all solutions (a, b, c) of the equation $a + b + 2c = 0$ is a subspace of $v_3(R)$
3. Show that the set w of the elements of the vector space $v_3(R)$ of the form $x + 2y, y, x + 3y$; $x, y \in R$ is a subspace of $v_3(R)$
4. Find Null Space, Range, Rank & Nullity of the linear transformation $T: R^2 \rightarrow R^3$ defined by $T(x, y) = (x + y, x - y, y)$
5. If $T: R^3 \rightarrow R^2$ be a linear transformation defined by $T(x_1, x_2, x_3) = (x_1 - x_2, x_1 + x_3)$. Find the rank (T) and Nullity (T).
6. Verify Rank Nullity Theorem for the linear transformation $T: R^3 \rightarrow R^3$ defined by $T(x, y, z) = (x - y, 2y + z, x + y + z)$
7. If α and β are orthogonal unit vectors (that is $\{\alpha, \beta\}$ is an orthogonal set), what is the distance α and β
8. Prove that two vectors α and β in a real inner product space are orthogonal iff $\|\alpha + \beta\|^2 = \|\alpha\|^2 + \|\beta\|^2$
9. Two vectors α and β in a complex inner product space are orthogonal iff $\|a\alpha + b\beta\|^2 = \|a\alpha\|^2 + \|b\beta\|^2$ for all pairs of scalar a & b .
10. If α and β are vectors in a real inner product space and if $\|\alpha\| = \|\beta\|$ then $\alpha - \beta$ and $\alpha + \beta$ are orthogonal

Module-3:

1. Find the Laplace Transform of $\sin 2t$, $\sin 3t$, & $\sin^3 2t$.
2. Find $L(e^{3t} \sin 2t)$ & $L(e^{4t} \sin 2t \cos t)$.
3. Find $L\left(\frac{1-e^{-t}}{t}\right)$ & $L\left[\frac{\cos at - \cos bt}{t}\right]$
4. Using unit step function find LT of $f(t) = \begin{cases} \sin t, & 0 < t < \pi \\ \sin 2t, & \pi < t < 2\pi \\ \sin 3t, & t > 2\pi \end{cases}$
5. Express $f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \cos 2t, & \pi < t < 2\pi \\ \cos 3t, & t > 2\pi \end{cases}$ in terms unit step function & hence find LT
6. Evaluate $L[t^2 u(t - 3)]$.
7. Find the inverse transform $\frac{s+2}{s^2-4s+13}$.
8. Find $L^{-1}\left(\frac{4s+5}{(s-1)^2(s+2)}\right)$
9. Find $L^{-1}\left(\frac{s}{s^4+4a^4}\right)$
10. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$.
11. Find $L^{-1}\left[\log\left(\frac{s+1}{s-1}\right)\right]$
12. Find $L^{-1}\left[\frac{s}{(2s-1)(3s-1)}\right]$
13. Using the Convolution THM obtain the $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$.
14. Solve the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3t}$ with $y(0) = 0 = y'(0)$, using LT
15. Solve the differential equation $y'' + 4y' + 3y = e^{-t}$, $y(0) = 1 = y'(0)$. Using LT

Module-4:

1. Find the real root of the equation $x \log_{10} x = 1.2$ by Regula-Falsi method correct to four decimal places.
2. Find by Newton's method, the real root of the equation $3x = \cos x + 1$.
3. Using the Newton's Raphson method, find a root of the following equations correct to the three decimal
4. Places. i) $3\sin x - 2x + 5 = 0$ near 3, ii) $x \sin x + \cos x = 0$ which is near $x = \pi$

5. Find by Newton's method, the root of the equation $\cos x = x e^x$.
6. Use Newton-Raphson method to find a real root of the equation $\log x - \cos x = 0$
7. By applying Weddle's Rule evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by considering 7 ordinates. Hence find the value of $\log_e 2$
8. Evaluate $\int_0^1 \frac{1}{1+x} dx$, by using Simpson 1/3 rd rule, considering seven ordinates. Hence deduce the value of $\log_e 2$.
9. Find the interpolating formula that approximates to the function described by the following table

x	0	1	2	5
y	2	3	12	147

10. Find 'y' when $x=0.26$ using appropriate interpolation formula to the following data,

X	0.10	0.15	0.20	0.25	0.30
Y	0.1003	0.1511	0.2027	0.2553	0.3093

11. If $y(5)=150$, $y(7)=392$, $y(11)=1492$, $y(13)=2366$, $y(17) = 5202$ then find $y(9)$ by using Lagrange's Formula
12. Apply Lagrange's Inverse interpolation formula to find a root of the equation $f(x)=0$ given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$, $f(42) = 18$.
13. Use Newton's divided difference formula to find $f(4)$ given

x	0	2	3	6
y	-4	2	14	158

14. The following table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface

x:height	100	150	200	250	300	350	400
y:distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when $x=218$ feet and 410 feet

15. From the following table, estimate the number of students who obtained marks between 40 & 45

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

16. In the table below the value of y are conjugative terms of a series of which 23.6 are the 6th term. Find

The first & tenth terms of the series

x	3	4	5	6	7	8	9
y	4.8	8.7	14.5	23.6	36.2	52.8	73.9

17. Given the values

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

Find $f(15)$ and $f(19)$

18. Use Newton's divided difference formula to find $f(x)$ given the data


x	0	2	3	6
f(x)	-4	2	14	158

19. Given the values

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

Evaluate $f(9)$ using divided difference formula for unequal intervals.

20. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's 1/3 rd rule taking four equal strips

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21. If $y(1)=3, y(3)=9, (4)=30, y(6)=132$, Find Lagrange's interpolation formula & hence find y at $x=5$.

22. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using

i) Simpson's $1/3^{\text{rd}}$ rule, ii) Simpson's $3/8^{\text{th}}$ rule, iii) Weddle's rule compare with its actual value.

23. Use Simpson's $1/3^{\text{rd}}$ rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

24. Using Simpson's $3/8^{\text{th}}$ rule, evaluate $\int_0^{0.3} \sqrt{1-8x^3} dx$ by taking 7 ordinates.

25. Integrate numerically $\int_0^{\pi/2} \sqrt{\cos\theta} d\theta$

Module-5:

1. Solve $\frac{dy}{dx} = x^2y - 1$ with $y(0) = 1$ using Taylor's series method and find $y(0.1)$ consider up to 4th degree terms.

2. Use Runge Kutta fourth order method to solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with $y(0) = 1$ and find y for $x = 0.2$ and 0.4 take $h = 0.2$.

3. Given $\frac{dy}{dx} = xy + y^2, y(0) = 1, y(0.1) = 1.1169, y(0.2) = 1.2773, y(0.3) = 1.5049$ find $y(0.4)$ accurate up to three decimal places using Milne's predictor corrector method.

4. Applying R-K method to find an approximate value of y for $x=0.2$ in steps of 0.1 of $\frac{dy}{dx} = x + y^2$ given that $y = 1$ when $x = 0$.

5. Given $\frac{dy}{dx} = x^2(1 + y)$ & $y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$. Evaluate $y(1.4)$ by Adams Bash Fourth method

6. Employ Taylor's series method to find an approximate solution correct to fourth decimal places for the following initial value problem at $x=0.1$ & 0.2 $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$.

7. Using Milne's predictor corrector method find y where $x = 0.8$ given $\frac{dy}{dx} = x - y^2, y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762$. Applying corrector formula twice.

8. Employ R-K method of 4th order to solve the equation $\frac{dy}{dx} = 3x + y/2, y(0) = 1$ at $x = 0.2$ taking step length $h = 0.1$.

9. Solve the differential equation $\frac{dy}{dx} = x^2 + y^2$ given $y(0) = 1$ to find the value of $y(0.1)$ by using Taylor's series method of order.

10. Using modified Euler's method, solve the equation $\frac{dy}{dx} = \frac{1}{x+y}, y(0) = 1$ in steps of 0.5 at $x = 1$

11. Using Taylor's series method to find y at the point $x = 0.1$ & $x = 0.2$ given that $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$

12. From the data given below find y at $x = 1.4$ using Milne's predictor corrector method $y' = \frac{x^2+y}{2}$

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514

16.0 University Result

Examination	S+	S	A	B	C	D	E	% Passing
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First Year Engg.


Academics

Course Plan

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Prepared by	Checked by		
			
Dr. S. L. Patil Prof. S. S. Thabaj	Dr. S. L. Patil	HOD	Principal

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Subject Title	Mathematics-II for Mechanical/Civil Engineering Stream		
Subject Code	BMATM/C201	IA Marks	50
Number of Lecture Hrs / Week	04	Exam Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03
CREDITS – 04			

FACULTY DETAILS:		
Name: Prof. S A Patil	Designation Asst.Prof.	Experience: 13 years
No. of times course taught 01 (including present)	Specialization: Mathematics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	First Year Engineering	I	Calculus and Linear Algebra

2.0 Course Objectives


This course viz., Advanced Calculus and Numerical Methods aims to prepare the students:

- **Familiarize** the importance of Integral calculus and Vector calculus essential for electronics
- **Analyze** electronics and electrical engineering problems by applying Partial Differential Equations.
- **Develop** the knowledge of solving electronics and electrical engineering problems numerically.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to

	Refined Course Outcome	Cognitive Level	POs
C201.1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume	L1, L2,L3	1,2,4,12
C201.2	Understand the applications of vector calculus refer to Solenoidal, irrotational vectors, line integral and surface integral.	L1, L2,L3	1,2,4,12
C201.3	Solve partial differential equations of fluid mechanics, electromagnetic theory and heat transfer.	L1, L2,L3	1,2,4,12
C201.4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.	L1, L2,L3	1,2,4,12
C201.5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB	L1, L2,L3	1,2,4,12

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4.0 Course Content

Module – 1

Introduction to Integral Calculus in Computer Science & Engineering

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study: Center of gravity, Duplication formula

Applications: Antenna and wave propagation, Calculation of optimum value in various geometries, Problems.
(RBTL: L1, L2 & L3)

Module –2

Introduction to Vector Calculus in EC & EE Engineering Applications.

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, Solenoidal and irrotational vector fields and problems.

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stokes theorem. Problems.
(RBTL: L1, L2 and L3) (8 Hours)

Self-Study: Volume integral and Gauss divergence theorem.

Applications: Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.

Module – 3

Partial Differential equations:

Formulation of PDE by elimination of arbitrary constants/functions, solution of non homogeneous PDE by direct integration, solution of homogeneous PDE involving derivative with respect to one Independent variable only.

Derivation of one dimensional heat and wave equations.

Self-Study: The various possible solutions of dimensional heat and wave equations by variable separable method.

Applications: Vibration of a rod/membrane.

Module –4

Importance of numerical methods for discrete data in the field of EC & EE engineering applications.

Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.

Self-Study: Bisection method, Lagrange's inverse Interpolation, Weddle's rule.

Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area.
(RBTL: L1, L2 and L3) (8 Hours)


Module –5

Introduction to various numerical techniques for handling EC & EE applications.

Numerical Solution of Ordinary Differential Equations (ODEs):

Numerical solution of ordinary differential equations of first order and first degree - Taylors series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector formula (No derivations of formulae), Problems.
(RBTL: L1, L2 and L3) (8 Hours)

Self-Study: Adam-Bashforth method.

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Applications: Estimating the approximate solutions of ODE for electric circuits.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	III and IV	Mechanical and Civil Engineering stream	Signals and systems, Control systems, LR, CR & LCR circuits, Electrostatics, Analysis of streamlines and electric potentials, Image processing, AI & ML, Graphs and networks, Computer graphics

6.0 Relevance to Real World


Sl. No	Real World Mapping
01	Vector calculus is used in electromagnetic fields, gravitational fields, and fluid flow. Vector integration is used in Electromagnetic field, Gravitational field, fluid flow.
02	Image processing, AI & ML, Graphs and networks, computer graphics.
03	Laplace transform are used in various areas of physics, electrical engineering, control engineering, optics, mathematics and signal processing. Laplace Transform is widely used by electronic engineers to solve quickly differential equations occurring in the analysis of electronic circuits
04	Estimating the approximate roots, extremum values, Area, volume, and surface area.
05	Numerical Methods are used in all fields of engineering and the physical sciences, life sciences, social sciences, medicine, business and even the arts have adopted elements of scientific computations.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Integrals

8.0 Books Used and Recommended to Students

Text Books
1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. (Reprint), 2018.
Reference Books
1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, Latest edition 10th Ed., 2022..
2. B.V.Ramana: "Higher Engineering Mathematics" 11 th Edition, Tata McGraw-Hill, 11 th Ed, 2017
3. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand publishing, 3 rd edition, 2014.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics", McGraw – Hill
5. James Stewart: "Calculus" Cengage publications, 7th edition, 2019.
6. Srimanta Pal & Subobh C Bhunna: "Engineering Mathematics", Oxford University Press, 3 rd Reprint, 2016.
7. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for I & II", McGraw-Hill Education (India) Pvt. Ltd., 2015.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6 th Ed., 2017.
Additional Study material & e-Books
1. CRC Standard Mathematical Tables and Formulae, 32nd Edition

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2. A Student's Guide to the Study, Practice, and Tools of Modern Mathematics- Bindner, Donald
3. P.N.Wartikar & J.N.Wartikar -Applied Mathematics (Volume I & II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994.
4. Peter V.O'Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
5. Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. <http://www.khanacademy.org/>
3. (MOOCs)
4. <http://academicearth.org/>
5. VTU EDUSAT Program
6. VTU e-Shikshana Program

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
	+ Plus Magazine	https://plus.maths.org/issue44.
	Mathematics Magazine	www.mathematicsmagazine.com

11.0 Examination Note

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (25 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of 25 Marks (duration 01 hour)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester
4. The average of best two IAs will be considered for the CIE

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester


Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

6. At the end of the 13th week of the semester

The Average of two tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks . Total CIE marks will be 50 marks (IA + CCE)

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

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Semester End Examination:


Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	Introduction: Evaluation of double and triple integrals	20
	2	Problems	
	3	Evaluation of double integrals by change of order of integration.	
	4	Evaluation of double integrals by changing into polar coordinates	
	5	Evaluation of Double and triple integrals to find the area and volume.	
	6	Beta and Gamma Functions-Properties	
	7	Beta and Gamma Functions- problems	
	8	Relation between Beta and Gamma function	
2	9	Introduction: Scalar and vector fields	20
	10	Gradient, directional derivatives	
	11	Curl and divergence-physical interpretation	
	12	Solenoidal and Irrotational vector fields	
	13	Line integrals	
	14	Green Theorem	
	15	Stokes Theorem	
	16	Applications to work done by a force and flux	
3	17	Introduction: Formation of Partial differential equations (PDE) by elimination of arbitrary constants problems	20
	18	Formation of Partial differential equations (PDE) by elimination of arbitrary functions problems	
	19	Solution Non- homogeneous PDE by Direct integration	
	20	Problems	
	21	Solution homogeneous PDE involving derivative w. r. t. one independent variable only	
	22	Problems	
	23	Derivation of one dimensional heat equation.	
	24	Derivation of one dimensional wave equation	
4	25	Solution of polynomial and transcendental equations	20
	26	Finite differences: Forward & backward differences	
	27	Newton's forward and backward interpolation formulae	
	28	Problems	
	29	Divided differences- Newton's divided difference formula	
	30	Lagrange's interpolation	
	31	Numerical integration: Simpson's one third rule	

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	32	Simpson's three eighth rule	
5	33	Numerical solution of ODE of first order & first degree	20
	34	Taylor's series method & Problems.	
	35	Modified Euler's method & Problems	
	36	Problems	
	37	Runge -Kutta method of fourth order & Problems	
	38	Problems	
	39	Milne's predictor and corrector method	
	40	Problems	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1&2 of the syllabus	6	Individual Activity.	Book 1, of the reference list. Website of the Reference list
2	Assignment 2: University Questions	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 3,4 & 5 of the syllabus	11	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list

14.0 QUESTION BANK

Module-- 1:

- Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z) dx dy dz$
- Evaluate $\int_0^5 \int_0^{x^2} x(x^2+y^2) dx dy$
- Evaluate $\int_0^1 \int_0^2 \int_1^2 (x^2 y z) dx dy dz$
- Evaluate $\int_0^1 \int_0^1 \int_0^y (x y z) dx dy dz$.
- Change the order of the integration in $I = \int_0^1 \int_{x^2}^{2-x} (xy) dx dy$ & hence evaluate the same.
- Find the volume bounded by the cylinder $x^2+y^2=4$ & the planes $y+z=4$ & $z=0$
- Find the volume of the ellipsoid $x^2/a^2+y^2/b^2+z^2/c^2=1$
- S.T the area between the parabolas $y^2=4ax$ & $x^2=4ay$ is $16/3a^2$
- Evaluate $\iint_A xy dx dy$, where A is the domain bounded by x-axis, ordinate $x=2a$ & the curve $x^2=4ay$
- Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$, by changing to polar coordinates.
- Change the order of integration and evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$.
- Find by double integration, the centre of gravity of the area of the cardioid $r = a(1 + \cos\theta)$
- Using double integration, find the centre of gravity of a lamina in the shape of quadrant of the curve $(\frac{x}{a})^{2/3} + (\frac{y}{b})^{2/3} = 1$, the density being $\rho = kxy$, where k is constant
- P.T $\beta(m+n, n)/m = \beta(m,n+1)/n = \beta(m,n)/m+n$.
- Prove that $\beta(m, n) = \frac{\Gamma m \Gamma n}{\Gamma m+n}$.

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Evaluate $\int_0^1 x^{3/2}(1-x)^{1/2} dx$

Module-2:

14. Find div F & curl F if $F = \square (x^3 + y^3 + z^3 - 3xyz)$

15. If $\phi = x^2 + y^2 + z^2$ and $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$, then find $\text{grad}\phi$, $\text{div}\vec{F}$ and $\text{curl}\vec{F}$

16. Find the value of the constants a, b & c such that the vector field,

$\vec{F} = (x + y + az)\vec{i} + (bx + 2y - z)\vec{j} + (x + cy + 2z)\vec{k}$ is irrotational and hence find a scalar

17. If $u = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$ & $v = yz\vec{i} + xz\vec{j} + yx\vec{k}$ then prove that $\vec{u} \times \vec{v}$ is a Solenoidal vector

18. Prove that $\text{div}(\phi\vec{A}) = \phi(\text{div}\vec{A}) + \text{grad}\phi \cdot \vec{A}$

19. Prove that $\text{curl}(\text{grad}\phi) = 0$

20. Prove that $\text{div}\text{curl}F = \nabla \cdot \nabla \times F = 0$

21. If $u = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$ & $v = yz\vec{i} + xz\vec{j} + yx\vec{k}$ then prove that $\vec{u} \times \vec{v}$ is a Solenoidal vector

22. If $\vec{v} = \vec{w} \times \vec{r}$, prove that $\text{curl}\vec{v} = 2\vec{w}$ where \vec{w} is a constant vector

23. Verify the Greens theorem $\oint_c (xy + y^2)dx + x^2dy$ where c is the closed curve of the region bounded by $y = x$ and $y = x^2$

24. Find the area between the parabola $y^2 = 4x$ and $x^2 = 4y$ with the help of Greens theorem in a plane.

25. Verify the Stroke's theorem for the vector function $\vec{F} = 2xy\vec{i} + (x^2 - y^2)\vec{j}$ over the circle $x^2 + y^2 = 1, z = 0$

26. Evaluate $\int_c xy dx + xy^2 dy$. by Stroke's theorem where c is the square in x y-plane with (1, 0), (-1, 0), (0,1) & (0, -1)

Module-3:

1. Find the differential equation of all planes which are at constant distance from the origin.

2. Find the differential equation of all spheres whose center lies on the plane $z=0$.

3. Form the PDE by eliminating the arbitrary function from $z=y^2+2f(1/x+\log y)$.

4. Solve $(x^2-yz)p+(y^2-zx)q=z^2-xy$

5. Solve the equation $x(y-z)p+y(z-x)q=z(x-y)$

6. Form the PDE of $z = yf(x)+xg(y)$ where f & g are arbitrary functions.

7. Form the PDE by eliminating function F from the equation $F(x+y+z, xy+z^2)=0$

8. Form the PDE from the equation $f(x+y+z, x^2+y^2-z^2)=0$

9. Solve the equation by direct integration $\partial^3 z / \partial x \partial y + 18xy^2 + \sin(2x-y) = 0$.

10. Solve $\partial^2 z / \partial x \partial y = x/y + a$.

Module-4:

15. Find the real root of the equation $x \log_{10} x = 1.2$ by Regula-Falsi method correct to four decimal places.

16. Find by Newton's method, the real root of the equation $3x = \cos x + 1$.

17. Using the Newton's Raphson method, find a root of the following equations correct to the three decimal

18. Places. i) $3\sin x - 2x + 5 = 0$ near 3, ii) $x \sin x + \cos x = 0$ which is near $x = \pi$

19. Find by Newton's method, the root of the equation $\cos x = x e^x$.

20. Use Newton-Raphson method to find a real root of the equation $\log x - \cos x = 0$

21. By applying Weddle's Rule evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by considering 7 ordinates. Hence find the value of $\log_e 2$

22. Evaluate $\int_0^1 \frac{1}{1+x} dx$, by using Simpson 1/3 rd rule, considering seven ordinates. Hence deduce the value of $\log_e 2$.

23. Find the interpolating formula that approximates to the function described by the following table

x	0	1	2	5
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y	2	3	12	147
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24. Find 'y' when $x=0.26$ using appropriate interpolation formula to the following data,

X	0.10	0.15	0.20	0.25	0.30
Y	0.1003	0.1511	0.2027	0.2553	0.3093

25. If $y(5)=150$, $y(7)=392$, $y(11)=1492$, $y(13)=2366$, $y(17)=5202$ then find $y(9)$ by using Lagrange's Formula

26. Apply Lagrange's Inverse interpolation formula to find a root of the equation $f(x)=0$ given that

$$f(30) = -30, f(34) = -13, f(38) = 3, f(42) = 18.$$

27. Use Newton's divided difference formula to find $f(4)$ given

x	0	2	3	6
y	-4	2	14	158

28. The following table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface

x:height	100	150	200	250	300	350	400
y:distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when $x=218$ feet and 410 feet

15. From the following table, estimate the number of students who obtained marks between 40 & 45

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

16. In the table below the value of y are conjugative terms of a series of which 23.6 are the 6th term. Find

The first & tenth terms of the series

x	3	4	5	6	7	8	9
y	4.8	8.7	14.5	23.6	36.2	52.8	73.9

17. Given the values

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

Find $f(15)$ and $f(19)$

18. Use Newton's divided difference formula to find $f(x)$ given the data

x	0	2	3	6
f(x)	-4	2	14	158

19. Given the values

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

Evaluate $f(9)$ using divided difference formula for unequal intervals.

20. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's 1/3 rd rule taking four equal strips

21. If $y(1)=3, y(3)=9, y(4)=30, y(6)=132$, Find Lagrange's interpolation formula & hence find y at $x=5$.


22. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using

i) Simpson's 1/3rd rule, ii) Simpson's 3/8th rule, iii) Weddle's rule compare with its actual value.

23. Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

24. Using Simpson's 3/8th rule, evaluate $\int_0^{0.3} \sqrt{1-8x^3} dx$ by taking 7 ordinates.

25. Integrate numerically $\int_0^{\frac{\pi}{2}} \sqrt{\cos\theta} d\theta$

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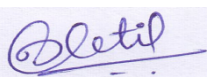


Module-5:

- Solve $\frac{dy}{dx} = x^2y - 1$ with $y(0) = 1$ using Taylor's series method and find $y(0.1)$ consider up to 4th degree terms.
- Use Runge Kutta fourth order method to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ and find y for $x = 0.2$ and 0.4 take $h = 0.2$.
- Given $\frac{dy}{dx} = xy + y^2, y(0) = 1, y(0.1) = 1.1169, y(0.2) = 1.2773, y(0.3) = 1.5049$ find $y(0.4)$ accurate up to three decimal places using Milne's predictor corrector method.
- Applying R-K method to find an approximate value of y for $x=0.2$ in steps of 0.1 of $\frac{dy}{dx} = x + y^2$ given that $y = 1$ when $x = 0$.
- Given $\frac{dy}{dx} = x^2(1 + y)$ & $y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$. Evaluate $y(1.4)$ by Adams Bash Fourth method
- Employ Taylor's series method to find an approximate solution correct to fourth decimal places for the following initial value problem at $x=0.1$ & 0.2 $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$.
- Using Milne's predictor corrector method find y where $x = 0.8$ given $\frac{dy}{dx} = x - y^2, y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762$. Applying corrector formula twice.
- Employ R-K method of 4th order to solve the equation $\frac{dy}{dx} = 3x + y/2, y(0) = 1$ at $x = 0.2$ taking step length $h = 0.1$.
- Solve the differential equation $\frac{dy}{dx} = x^2 + y^2$ given $y(0) = 1$ to find the value of $y(0.1)$ by using Taylor's series method of order.
- Using modified Euler's method, solve the equation $\frac{dy}{dx} = \frac{1}{x+y}, y(0) = 1$ in steps of 0.5 at $x = 1$
- Using Taylor's series method to find y at the point $x = 0.1$ & $x = 0.2$ given that $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$
- From the data given below find y at $x = 1.4$ using Milne's predictor corrector method $y' = \frac{x^2 + y}{2}$

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514


16.0 University Result

Examination	S+	S	A	B	C	D	E	% Passing

Prepared by		Checked by					
							
Prof. S A Patil		Dr. S. L. Patil		HOD		Principal	
Subject Title		Applied Physics for EEE Stream					
Subject Code		BPHY102		CIA Marks		50	
Number of Lecture Hrs / Week		06(2L+2T+2P)		SEE Marks		50	
Total Number of Lecture Hrs		40		Exam Hours		03 Hour	
CREDITS – 04							

FACULTY DETAILS:

Name: Sri. V. M. Bhumannavar	Designation: Asst. Professor	Experience: 1) 17.5 Years
No. of times course taught: 24		Specialization: Spectroscopy

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1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	First year (Common to all)	I/II	Fundamentals of Physics

2.0 Course Objectives

This course (21PHY12) will enable students

1. To make the students understand and interpret in experimental section manually.
2. Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
3. Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology
4. To acquire the knowledge of basic fundamental science.
5. To inculcate understanding of the theory and applications of fundamental in experiments with the theoretical knowledge.
6. To familiarize the students with Indian Standards units and measurements of the fundamental values.
7. To impart knowledge of mechanics and some of basic expressions using in its applications.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and use modeling software's to generate


	Course Outcome	Cognitive Level	POs
C105.1	Describe the principles of LASERS and Optical fibers and their relevant applications.	L1,L2,L3	1,2,3,8,12
C105.2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.	L1,L2,L3	1,2,3,8,12
C105.3	Summarize the essential properties of superconductors and its applications in qubits.	L1,L2,L3	1,2,3,8,12
C105.4	Illustrate the application of physics in design and data analysis.	L1,L2,L3	1,2,3,8,12
C105.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.	L1,L2,L3	1,2,3,8,12
Total Hours of instruction		40 Hours	

4.0 Course Content

MODULE-1

Quantum Mechanics:

de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. Numerical Problems.

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Pre requisite: Wave-Particle dualism

Self-learning: de Broglie Hypothesis

08 Hours

MODULE-2

Electrical Properties of Solids:

Conductors:

Quantum Free Electron Theory of Metals: Assumptions, Fermi-energy, Fermi factor, Variation of Fermi Factor with Temperature and Energy, Mention of expression for electrical conductivity. Dielectric Properties: Polar and non-polar dielectrics, Electrical Polarization Mechanisms, internal fields in solids, Clausius-Mossotti equation (Derivation), Solid, Liquid and Gaseous dielectrics. Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.

Superconductivity:

Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), High Temperature superconductivity, SQUID, MAGLEV, Numerical problems.

Pre-requisites: Classical Free Electron Theory

Self-learning: Dielectrics Basics

08 Hours

MODULE-3

Laser and Optical Fibers:

LASER: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, carbon dioxide Laser, Applications: Defence (Laser range finder) Laser Printer, Numerical Problems.

Optical Fiber: Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems

Pre requisite: Properties of light

Self-learning: Total Internal Reflection.

08 Hours

MODULE-4

Maxwell's Equations and EM waves:

Maxwell's Equations: Fundamentals of Vector Calculus. Divergence and Curl of Electric field and Magnetic field (static), Gauss' divergence theorem and Stoke's theorem. Description of laws of Electrostatics, Magnetism, Faraday's laws of EMI, Current Density, Equation of Continuity, Displacement Current (with derivation), Maxwell's equations in vacuum, Numerical Problems EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane Electromagnetic Waves in vacuum, their transverse nature.

Pre-requisite:Electricity & Magnetism


Self-learning: Fundamentals of vector calculus.

08 Hours

MODULE-5

Semiconductors and Devices:

Fermi level in Intrinsic & Extrinsic Semiconductor, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression),Relation between Fermi energy & Energy gap in intrinsic semiconductors(derivation), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. Photo-

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diode and Power responsivity, Construction and working of Semiconducting Laser, Four probe method to determine resistivity, Phototransistor, Numerical problems.

Pre-requisite: Basics of Semiconductors

Self-learning: Fermi level in Intrinsic & Extrinsic Semiconductors

08 Hours

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	Higher Semester	Statics and Dynamics Strength of Materials Thermodynamics Materials and Metallurgy Machine design Fluid Mechanics Hydraulics and Pneumatics Mechatronics Robotics Material Characterization	Basic fundamentals

6.0 Relevance to Real World


SL.No	Real World Mapping
01	The basic principle of communication is done with optical fibers
02	Basic fundamentals related to electrical conductivity of metals.
03	Basic fundamentals related to animation are studied in detail
04	Applications of laser in the field of computer science and engineering devices are discussed.
05	Basic fundamentals related to optical fiber in communication engineering.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Chalk and Talk	This delivery method is adapted to all modules.
02	Self prepared PPTs	The PPTs are also used in the discussions wherever necessary in the syllabus.
03	Self Prepared videos	Self prepared videos are also used for better understanding.
04	Experimental Demonstration	Experimental Demonstration is done to the students for better understanding of concepts.
05	Tutorial	Topic: Module I to Module V
06	NPTEL	Engineering Physics Videos


8.0 Books Used and Recommended to Students

Suggested Text Books

	S J P N Trust's Hirasugar Institute of Technology, Nidasoshi. <i>Inculcating Values, Promoting Prosperity</i>	First Year Engg.
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	Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE& ECE	Course Plan
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Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8th Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
4. Concepts of Modern Physics, Arthur Beiser, McGrawhill, 6th Edition, 2009.
5. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
6. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
8. Quantum Computing, Vishal Sahani, McGraw Hill Education, 2007 Edition.
9. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc GrawHill, Reprint 2020.
10. Engineering Physics, S P Basavaraj, 2005 Edition, Subhash Stores.
11. Physics for Animators, Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
12. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations, Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli, Trends in Logic, Volume 48, Springer.
13. Statistical Physics: Berkeley Physics Course, Volume 5, F. Reif, McGraw Hill.
14. Introduction to Superconductivity, [Michael Tinkham](#), McGraw Hill, INC, II Edition

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9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

LASER: <https://www.youtube.com/watch?v=WgzynecPiyc>
Superconductivity :
<https://www.youtube.com/watch?v=MT5XI5ppn48> **Optical Fiber :**
https://www.youtube.com/watch?v=N_kA8EpCUQo
Quantum Mechanics :
<https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s> **Quantum Computing :** <https://www.youtube.com/watch?v=jHoEjvuPoB8> **Quantum Computing :** <https://www.youtube.com/watch?v=ZuvCUU2jD30>
Physics of Animation : https://www.youtube.com/watch?v=kj1kaA_8Fu4
Statistical Physics Simulation : https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html
NPTEL Superconductivity: <https://archive.nptel.ac.in/courses/115/103/115103108/> **NPTEL Quantum Computing :** <https://archive.nptel.ac.in/courses/115/101/115101092> **Virtual LAB :** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham> **Virtual LAB :**
<https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
<https://www.britannica.com/technology/laser,k>
<https://nptel.ac.in/courses/115/102/115102124/>
<https://nptel.ac.in/courses/115/104/115104096/>
<http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
https://onlinecourses.nptel.ac.in/noc20_mm14/preview
<https://bookspare.com/>
<https://www.khanacademy.org/science/physics>
<https://www.physicsgalaxy.com>
<https://freevideolectures.com/Subject/Physics>
<https://www.physics.org/>

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	International Journal of Engineering Science	https://www.journals.elsevier.com/international-journal-of-engineering-science
2	International Journal of Engineering Trends and Technology	http://ijettjournal.org/


11.0 Laboratory Component

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- Exercise
- Demonstration
- Structured Inquiry
- Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

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List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations
<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

12.0 Examination Note

Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks. CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks CIE for the practical component of the IC**


- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory

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component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks. The theory component of the IC shall be for both CIE and SEE.

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

13.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
1	1	de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy	Chalk and Talk,		20
	2	Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic),	Chalk and Talk, Power-point Presentation		
	3	Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation),	Chalk and Talk,		
	4	Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values,	Chalk and Talk, Power-point Presentation		
	5	Particle inside one dimensional infinite potential well,	Chalk and Talk,		
	6	Quantization of Energy States	Chalk and Talk,		
	7	Waveforms and Probabilities.	Chalk and Talk, Power-point Presentation		
	8	Numerical Problems.	Chalk and Talk, Power-point Presentation	Demonstration of optical fiber	
2	9	Quantum Free Electron Theory of Metals: Assumptions, Fermi-energy, Fermi factor,	Chalk and Talk,		20



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	10	Variation of Fermi Factor with Temperature and Energy, Mention of expression for electrical conductivity.	Chalk and Talk,		
	11	Dielectric Properties: Polar and non-polar dielectrics, Electrical Polarization Mechanisms, internal fields in solids	Chalk and Talk		
	12	Clausius-Mossotti equation (Derivation), Solid, Liquid and Gaseous dielectrics.	Chalk and Talk		
	13	Application of dielectrics in transformers, Capacitors,	Chalk and Talk		
	14	Electrical Insulation. Numerical Problems. Introduction to Superconductors,	Chalk and Talk		
	15	Temperature dependence of resistivity, Meissner Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors,	Chalk and Talk		
	16	BCS theory (Qualitative), High Temperature superconductivity, SQUID, MAGLEV, Numerical problems.	Chalk and Talk,		
3	17	Characteristic properties of a LASER beam, Interaction of Radiation with Matter,	Chalk and Talk, Power-point Presentation	Demonstration of laser bar coder	
	18	Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State	Chalk and Talk, Power-point Presentation		
	19	Requisites of a laser system, carbon dioxide Laser, Applications:	Chalk and Talk,		
	20	laser range finder Laser Printer, Numerical Problems.	Chalk and Talk,	Demonstration of laser printer	
	21	Optical Fiber: Principle and Structure, Propagation of Light,	Chalk and Talk		
	22	Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA,	Chalk and Talk, Power-point Presentation	Demonstration of Numerical Aperture Experiment	20
	23	Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses,	Chalk and Talk, Power-point Presentation		
24	Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems	Chalk and Talk, Power-point Presentation			
4	25	Maxwell's Equations: Fundamentals of Vector Calculus. Divergence and Curl of Electric field and Magnetic field (static),	Chalk and Talk, Power-point Presentation		20



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	26	Gauss' divergence theorem and Stoke's theorem. Description of laws of Electrostatics, Magnetism	Chalk and Talk,		
	27	Faraday's laws of EMI, Current Density, Equation of Continuity	Chalk and Talk,		
	28	Displacement Current (with derivation), Maxwell's equations in vacuum,	Chalk and Talk		
	29	Numerical Problems	Chalk and Talk		
	30	EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations),	Chalk and Talk, Power-point Presentation		
	32	Plane Electromagnetic Waves in vacuum, their transverse nature.	Chalk and Talk, Power-point Presentation		
5	33	Fermi level in Intrinsic & Extrinsic Semiconductor	Chalk and Talk, Power-point Presentation		20
	34	Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression),	Chalk and Talk, Power-point Presentation		
	35	Relation between Fermi energy & Energy gap in intrinsic semiconductors(derivation),	Chalk and Talk, Power-point Presentation		
	36	Law of mass action, Electrical conductivity of a semiconductor (derivation),	Chalk and Talk, Power-point Presentation		
	37	Hall effect, Expression for Hall coefficient (derivation) and its application	Chalk and Talk, Power-point Presentation		
	38	Photo-diode and Power responsivity, Construction and working of Semiconducting	Chalk and Talk, Power-point Presentation		
	39	Laser, Four probe method to determine resistivity,	Chalk and Talk, Power-point Presentation		
	40	Phototransistor, Numerical problems	Chalk and Talk, Power-point Presentation		

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14.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Section of Oscillations and Waves	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 4 of the syllabus	10	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Modern Physics & Quantum Mechanics	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 5 of the syllabus	12	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list

15.0 QUESTION BANK

MODULE: 1


Quantum Mechanics

1. State de Broglie hypothesis. Show that the de Broglie wavelength for an electron accelerated by a potential difference V volt is $\lambda = 1.226/\sqrt{v}$ nm for non-relativistic case.
2. What are matter waves? Mention their properties.
3. Explain Heisenberg's Uncertainty Principle.
4. Show that a free electron can't exist within the nucleus of an atom.
5. Set up time independent one dimensional Schrodinger's equation.
6. What is a wave function? Give its physical significance and properties.
7. What is a normalization of a wave function?
8. Find Eigen values and Eigen functions for a particle in one dimensional infinite potential well.
9. Assuming the time independent Schrodinger wave equation, discuss the solutions for energy of a particle in one dimensional infinite potential well.
10. Solve the Schrodinger wave equation for the allowed energy values in the case of particle in a box.
11. Obtain the time independent Schrodinger wave equation for a particle in one dimensional potential well of infinite height and discuss the solutions.
12. Obtain the Schrodinger wave equation for a free particle and discuss its solutions..

MODULE: 2

Electrical Properties of Materials and Applications Electrical Conductivity in metals

1. Explain any three drawbacks of classical free-electron theory and success of Quantum theory.
2. Describe how quantum free electron theory has been successful in overcoming the failures of classical free electron theory.
3. Mention assumptions of quantum free electron theory.
4. Define Fermi factor. Discuss the probability of occupation of various energy states by electrons at $T=0$ K, and $T > 0$ K, on the basis of Fermi factor.

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5. Derive the expression for Fermi energy of metal at 0 K temperatures.
6. Derive the relation between Fermi energy and energy gap for an intrinsic semiconductor.
7. Write a note on Super Conductors.
8. Explain the Temperature dependence of resistivity of superconductor
9. What is Meissner's Effect
10. What is Critical Field
11. Explain the temperature dependence of Critical field
12. Write a note types of Super Conductors
13. Explain BCS theory
14. What is Quantum Tunnelling
15. What are high temperature superconductivity
16. Explain Josephson Junctions
17. What are DC and RF SQUIDS

MODULE: 3


Lasers & Optical Fibers

1. What is laser? Explain the terms a) Induced absorption b) Spontaneous emission c) Stimulated emission. d) Metastable state and e) Population inversion.
2. Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein's coefficients.
3. Discuss the conditions to be met by an active system for laser action.
4. Describe the requisites of a laser system.
5. Describe construction and working of a CO₂ laser.
6. Describe the construction and working of a semiconductor laser.
7. Write a note on industrial applications of lasers.
8. Describe construction & working of semiconductor laser along with the applications.
9. Describe the technique of measurement of pollutants in atmosphere using a laser beam.
10. Explain in brief laser used as range finder.

MODULE-4

Maxwell's Equations and EM waves:

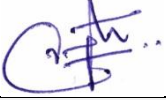
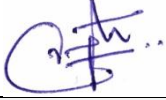

1. State Faraday's laws of induction and state Lenz's law.
2. Describe how quantum free electron theory has been successful in overcoming the failures of classical free electron theory.
3. Mention assumptions of quantum free electron theory.
4. Define Fermi factor. Discuss the probability of occupation of various energy states by electrons at T=0 K, and T >0 K, on the basis of Fermi factor.
5. Derive the expression for Fermi energy of metal at 0 K temperatures.
6. Derive the relation between Fermi energy and energy gap for an intrinsic semiconductor.
7. Write a note on Super Conductors.
8. Explain the Temperature dependence of resistivity of superconductor
9. What is Meissner's Effect
10. What is Critical Field


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MODULE-5

Semiconductors and Devices:

1. What are semiconductors? Distinguish the types.
2. What are extrinsic semiconductors? How are they formed?
3. What is a transistor? Name the types.
4. Distinguish the types of transistors symbolically.
5. Distinguish the parts of a transistor with reference to their volume and doping concentration.
6. What is a semiconductor? Discuss its types with examples.
7. What are pentavalent and trivalent impurities? Give examples.
8. How many p-n junctions does a transistor have? How are they biased? Explain the reason.
9. Explain Hall effect
10. Derive the expression for electrical conductivity of semiconductors

Prepared by	Checked by		
			
Sri. V.M.Bhumannavar	Sri.V.M.Bhumannavar	HOD	Principal

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Subject Title	Applied Physics for ME Stream		
Subject Code	BPHYM102/202	CIA Marks	50
Number of Lecture Hrs / Week	06(2L+2T+2P)	SEE Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03 Hour
CREDITS – 04			

FACULTY DETAILS:		
Name: Mr. S. B. Radder	Designation: Asst. Professor	Experience: 1) 5 Years
No. of times course taught: 8		Specialization: Spectroscopy

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	First year (Common to all)	I/II	Fundamentals of Physics

2.0 Course Objectives


This course (BPHYM102/202) will enable students

8. To make the students understand and interpret in experimental section manually.
9. Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
10. Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology
11. To acquire the knowledge of basic fundamental science.
12. To inculcate understanding of the theory and applications of fundamental in experiments with the theoretical knowledge.
13. To familiarize the students with Indian Standards units and measurements of the fundamental values.
14. To impart knowledge of mechanics and some of basic expressions using in its applications.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and use modeling software's to generate

	Course Outcome	Cognitive Level	POs
C105.1	Describe the types of oscillations and applications of shock waves.	L1,L2,L3	1,2,3,8,12
C105.2	Discuss the advanced elastic materials, beams with number of advantages.	L1,L2,L3	1,2,3,8,12
C105.3	Illustrate the application of thermoelectric materials.	L1,L2,L3	1,2,3,8,12
C105.4	Illustrate the application Cryogenics, in Aerospace and Food process	L1,L2,L3	1,2,3,8,12
C105.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.	L1,L2,L3	1,2,3,8,12
Total Hours of instruction		40 Hours	

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4.0 Course Content

MODULE-1

Oscillations and Shock waves:

Oscillations: Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems. Shock waves: Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.

Pre-requisites: Basics of Oscillations

Self-learning: Simple Harmonic motion, Differential equation for SHM

08 Hours

MODULE-2

Elasticity

Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y , n and σ (with derivation), mention relation between K , Y and σ , limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression, Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.

Pre requisites: Elasticity, Stress & Strain

Self-learning: Stress-Strain Curve

08 Hours

MODULE-3

Thermoelectric materials and devices:

Thermo emf and thermo current, Seebeck effect, Peltier effect, Seebeck and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo emf in terms of T_1 and T_2 , Thermo couples, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), Numerical Problems

Pre requisites: Basics of Electrical conductivity

Self-learning: Thermo emf and thermo current

08 Hours

MODULE-4

Cryogenics:

Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Lindey's air liquefier, Liquefaction of Helium and its properties, Platinum Resistance Thermometer, Applications of Cryogenics, in Aerospace, Tribology and Food processing(qualitative), Numerical Problems

Pre requisites: Basics of Heat and Thermodynamics

Self-learning: Application of Cryogenics in Food Processing


08 Hours

MODULE-5

Material Characterization and Instrumentation Techniques:

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Introduction to nano materials: Nanomaterial and nanocomposites. Principle, construction and working of X-ray Diffractometer, Crystallite size determination by Scherrer equation, Atomic Force Microscopy (AFM): Principle, construction, working and applications, X-ray photoelectron spectroscopy(XPS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Numerical Problems.

Pre requisites: Quantum Mechanics

Self-learning: Crystallite

08 Hours

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	Higher Semester	Statics and Dynamics Strength of Materials Thermodynamics Materials and Metallurgy Machine design Fluid Mechanics Hydraulics and Pneumatics Mechatronics Robotics Material Characterization	Basic fundamentals


6.0 Relevance to Real World

SL.No	Real World Mapping
01	The basic principle oscillations and shock waves
02	Basic fundamentals related to elastic materials.
03	Basic fundamentals related to thermoelectric materials are studied in detail
04	Applications of Cryogenics, in Aerospace and Food processing are discussed.
05	Basic fundamentals related Instrumentation techniques are discussed.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Chalk and Talk	This delivery method is adapted to all modules.
02	Self prepared PPTs	The PPTs are also used in the discussions wherever necessary in the syllabus.
03	Self Prepared videos	Self prepared videos are also used for better understanding.
04	Experimental Demonstration	Experimental Demonstration is done to the students for better understanding of concepts.
05	Tutorial	Topic: Module I to Module V
06	NPTEL	Engineering Physics Videos

8.0 Books Used and Recommended to Students

	S J P N Trust's Hirasugar Institute of Technology, Nidasoshi. <i>Inculcating Values, Promoting Prosperity</i> Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi Recognized under 2(f) & 12B of UGC Act, 1956 Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE& ECE	First Year Engg. Academics Course Plan AY:2022-23 (Even)
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Suggested Text Books

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
2. Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co, 2001.
3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997
4. Mechanical Properties of Engineered Materials by Wole Soboyejo, CRC Press; 1st edition, 2002
5. Heat & Thermodynamics and Statistical Physics(XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006. 4
6. Heat and Thermodynamics (I-Edition) – D.S.Mathur - S. Chand & Company Ltd., New-Delhi, 1991
7. Heat and Thermodynamics, Brijlal & Subramanyam, S. Chand & Company Ltd., New-Delhi.
8. Physics of Cryogenics by Bahman Zohuri, Elsevier, 2018
9. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
10. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.
11. Nanoscience and Nanotechnology: Fundamentals to Frontiers – M.S.Ramachandra Rao & Shubra Singh, Wiley India Pvt Ltd.
12. Nano Composite Materials-Synthesis, Properties and Applications, J. Parameswaranpillai, N.Hameed, T.Kurian, Y. Yu, CRC Press.
13. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi, 2014

9.0

Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Simple Harmonic motion: <https://www.youtube.com/watch?v=k2FvSzWeVxQ>

Shock waves: <https://physics.info/shock/>

Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk

Stress- strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>

Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>

Fracture in materials: <https://www.youtube.com/watch?v=x47nky4MbK8>

Thermoelectricity: https://www.youtube.com/watch?v=2w7NBuu5w9c&list=PLtkeUZItwHK5y6qy1GFxa4Z4Rc_mzUaaz6

Thermoelectric generator and coolers: <https://www.youtube.com/watch?v=NruYdb31xk8>

Cryogenics: <https://cevgroup.org/cryogenics-basics-applications/>

Liquefaction of gases: <https://www.youtube.com/watch?v=aMelwOsGpIs>

Virtual lab: <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

Material characterization : https://onlinecourses.nptel.ac.in/noc20_mm14/preview

<https://www.encyclopedia.com/science-and-technology/physics/physics/cryogenics>


https://www.usna.edu/NAOE/files/documents/Courses/EN380/Course_Notes/Ch10_Deformation.pdf

10.0

Magazines/Journals Used and Recommended to Students

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Sl.No	Magazines/Journals	website
1	International Journal of Engineering Science	https://www.journals.elsevier.com/international-journal-of-engineering-science
2	International Journal of Engineering Trends and Technology	http://ijettjournal.org/

11.0 Laboratory Component

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- e) Exercise
- f) Demonstration
- g) Structured Inquiry
- h) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

List of Experiments

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modulus of the material of the given bar Single Cantilever.
9. Determination of the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations


(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>)

12.0 Examination Note

Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks. CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20marks.

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks** CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

13.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
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Academics

Course Plan

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1	1	Simple Harmonic motion (SHM), Differential equation for SHM (No derivation),	Chalk and Talk,	20
	2	Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation),	Chalk and Talk, Power-point Presentation	
	3	Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach).	Chalk and Talk,	
	4	Engineering applications of Damped oscillations Theory of Forced oscillations (Qualitative)	Chalk and Talk, Power-point Presentation	
	5	Resonance, Sharpness of resonance. Numerical Problem	Chalk and Talk,	
	6	Shock waves: Mach number and Mach Angle, Mach Regimes	Chalk and Talk,	
	7	Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube,	Chalk and Talk, Power-point Presentation	
	8	Applications of Shock Waves, Numerical problems.	Chalk and Talk, Power-point Presentation	
2	9	Stress-Strain Curve, Stress hardening and softening.	Chalk and Talk,	20
	10	Elastic Moduli, Poisson's ratio,	Chalk and Talk,	
	11	Relation between Y , n and σ (with derivation),	Chalk and Talk	
	12	mention relation between K , Y and σ , limiting values of Poisson's ratio.	Chalk and Talk	
	13	Beams, Bending moment and derivation of expression,	Chalk and Talk	
	14	Cantilever and I section girder and their Engineering Applications,	Chalk and Talk	
	15	Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture,	Chalk and Talk	
	16	Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems	Chalk and Talk,	
3	17	Thermo emf and thermo current, Seeback effect,	Chalk and Talk, Power-point Presentation	20
	18	Peltier effect, Seeback and Peltier coefficients, figure of merit (Mention Expression),	Chalk and Talk,	

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First Year Engg.

Academics

Course Plan

AY:2022-23 (Even)

	19	laws of thermoelectricity. Expression for thermo emf in terms of T1 and T2,	Chalk and Talk,		
	20	Thermo couples, thermopile, Construction and Working of Thermoelectric generators (TEG),	Chalk and Talk,		
	21	Construction and Working of Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials	Chalk and Talk		
	22	Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), Numerical Problems	Chalk and Talk, Power-point Presentation		
	23	Refrigerator, Space Program (RTG)	Chalk and Talk, Power-point Presentation		
	24	Numerical Problems	Chalk and Talk,		
4	25	Basics of heat and thermodynamics	Chalk and Talk, Power-point Presentation		20
	26	Production of low temperature - Joule Thomson effect (Derivation with 3 cases)	Chalk and Talk, Power-point Presentation		
	27	Porous plug experiment with theory,	Chalk and Talk, Power-point Presentation		
	28	Thermodynamical analysis of Joule Thomson effect	Chalk and Talk		
	29	Liquefaction of Oxygen by cascade process, Lindey's air liquefier,	Chalk and Talk		
	30	Liquefaction of Helium and its properties, Platinum Resistance Thermometer,	Chalk and Talk, Power-point Presentation		
	31	Applications of Cryogenics, in Aerospace, Tribology and Food processing(qualitative),	Chalk and Talk		
	32	Numerical Problems	Chalk and Talk		
	33	Introduction to nano materials: Nanomaterial and nanocomposites.	Chalk and Talk, Power-point Presentation		
	34	Principle, construction and working of X-ray Diffractometer	Chalk and Talk, Power-point Presentation		

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5	35	Crystallite size determination by Scherrer equation	Chalk and Talk, Power-point Presentation	20
	36	Atomic Force Microscopy (AFM): Principle, construction, working and applications,.	Chalk and Talk, Power-point Presentation	
	37	X-ray photoelectron spectroscopy(XPS),	Chalk and Talk, Power-point Presentation	
	38	Scanning electron microscopy (SEM)	Chalk and Talk, Power-point Presentation	
	39	Transmission electron microscopy (TEM),	Chalk and Talk, Power-point Presentation	
	40	Numerical Problems	Chalk and Talk	

14.0 Assignments, Pop Quiz, Mini Project, Seminars


Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Section of cryogenics	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 4 of the syllabus	10	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Material characterization and Instrumentation techniques	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 5 of the syllabus	12	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list

15.0 QUESTION BANK

MODULE: 1

Waves and Oscillations

- Define simple harmonic oscillations . Derive the expression for differential equation for SHM and mention its solution
- What is the expression for period of oscillation for a mass spring oscillator? Derive the expression for equivalent force constant for springs in series and parallel combination. mention the expression for period of its oscillation

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3. What are damped vibrations/oscillations? Give the theory of damped vibrations/oscillations, and find the condition of heavy, critical and light damping
4. What are forced oscillations ? Obtain an expression for amplitude and phase of the body undergoing forced vibrations.
5. Discuss the dependence of amplitude and phase of a forced vibrations on the frequency of the applied external force
6. Define sharpness of resonance . Write a short note on Helmholtz resonator
7. Define mach number and distinguish between acoustic, ultrasonic, subsonic and supersonic waves
8. Explain the conservational laws of mass, momentum and energy
9. Explain the construction and working of Reddy shock tube experiment.
10. Explain the applications of shock waves

MODULE: 2

Elasticity

11. Define elasticity. Explain stress strain curve
12. Define stress and strain.
13. Define Young's modulus (Y), Bulk modulus(K) and Rigidity modulus(n).
14. With neat diagram explain stress strain curve for elastic materials.
15. Define Young's modulus (Y), Rigidity modulus(n) and Poisson's ratio and derive the relation between them
16. Explain different types of beams.
17. Mention the engineering applications of cantilever and I-section grider.
18. Explain different failure mechanism in the materials.
19. Define bending moment and derive the expression for bending moment with the help of neat sketch.
20. Classify the beams and give two applications.

MODULE: 3


Thermoelectric materials and devices

1. Describe the construction and working of thermoelectric generators(TEG).
2. Mention the applications of TEG.
3. State seeback effect and peltier effect.
4. Explain the variation of thermoelectric emf with temperature and obtain the relation between inversion temperature and neutral temperature.
5. Explain the working of thermoelectric coolers.
6. Explain the construction and working of thermocouples.
7. Mention the advantages and limitations of thermocouples.
8. Exhaust of Automobiles, Refrigerator.
9. Explain the construction and working of thermoelectric generators.
10. Explain laws of thermoelectricity.

MODULE-4

Cryogenics:

18. What is joule Thomson effect.
19. Explain liquefaction of oxygen by cascade process.
20. Explain the construction and working of Porous plug experiment with neat diagram.


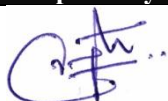

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21. Describe the construction working of platinum resistance thermometer.
22. Mention the advantages of platinum resistance thermometer.
23. Explain liquefaction of Helium and its properties.
24. Explain Lindey's air liquefier.
25. Describe the role of Cryogenics, in Aerospace, Tribology and Food processing.
26. Explain Platinum resistant thermometers.
27. Explain Thermodynamical analysis of Joule Thomson effect

MODULE-5

Applications of Physics in computing


1. What are nanomaterials
2. Classify the nano-materials based on their constraints.
3. Explain the construction and working of X-ray diffractometer.
4. Explain the principle of AFM.
5. With the neat diagram explain the principle, construction and working of atomic force microscope (AFM).
6. Describe the principle, construction and working of scanning electron microscope(SEM) with neat diagram.
7. With the neat diagram explain Principle, construction, working and applications, X-ray photoelectron spectroscopy(XPS)
8. Describe the construction and working of Transmission electron microscopy (TEM),
9. Explain the Crystallite size determination by Scherrer equation.
10. Give a short note on nano-composites.

Prepared by	Checked by		
		HOD	Principal
Sri. V.M.Bhumannavar	Sri.V.M.Bhumannavar		

Subject Title	Applied Physics for CV Stream		
Subject Code	BPHYC102/202	CIA Marks	50
Number of Lecture Hrs / Week	06(2L+2T+2P)	SEE Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03 Hour
CREDITS – 04			

FACULTY DETAILS:

Name: Mr. S. B. Radder	Designation: Asst. Professor	Experience: 1) 5 Years
No. of times course taught: 8	Specialization: Spectroscopy	

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1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	First year (Common to all)	I/II	Fundamentals of Physics

2.0 Course Objectives

This course (BPHYC102/202) will enable students

15. To make the students understand and interpret in experimental section manually.
16. Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
17. Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology
18. To acquire the knowledge of basic fundamental science.
19. To inculcate understanding of the theory and applications of fundamental in experiments with the theoretical knowledge.
20. To familiarize the students with Indian Standards units and measurements of the fundamental values.
21. To impart knowledge of mechanics and some of basic expressions using in its applications.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and use modeling software's to generate


	Course Outcome	Cognitive Level	POs
C105.1	Describe the types of oscillations and applications of shock waves.	L1,L2,L3	1,2,3,8,12
C105.2	Discuss the advanced elastic materials, beams with number of advantages.	L1,L2,L3	1,2,3,8,12
C105.3	Impact of Noise in Multi-storied buildings.	L1,L2,L3	1,2,3,8,12
C105.4	Describe the principle of laser and optical fibers and their relevant applications	L1,L2,L3	1,2,3,8,12
C105.5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.	L1,L2,L3	1,2,3,8,12
Total Hours of instruction		40 Hours	

4.0 Course Content

MODULE-1

Oscillations and Shock waves:

Oscillations: Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems. Shock waves: Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.

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Pre-requisites: Basics of Oscillations

Self-learning: Simple Harmonic motion, Differential equation for SHM

08 Hours

MODULE-2

Elasticity

Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y , n and σ (with derivation), mention relation between K , Y and σ , limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression, Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.

Pre requisites: Elasticity, Stress & Strain

Self-learning: Stress-Strain Curve

08 Hours

MODULE-3

Acoustics, Radiometry and Photometry: Acoustics:

Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power and Absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures, Sound Insulation and its measurements. Noise and its Measurements, Impact of Noise in Multi-storied buildings

Radiometry and Photometry: Radiation Quantities, Spectral Quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

Pre requisites: Basics of Sound, Waves & light properties

Self-learning: Introduction to acoustics.

08 Hours

MODULE-4

Laser and Optical Fibers:

Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Semiconductor LASER, LASER Range Finder, LIDAR, Road Profiling, Bridge Deflection, Speed Checker, Numerical Problems. Optical Fiber Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA, Modes of Propagation, Attenuation and Fiber Losses, Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical Problems

Pre requisite: Properties of light


Self-learning: Total Internal Reflection.

08 Hours

MODULE-5

Natural hazards and Safety

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earth quake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc. ,types of land slide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing. Fire hazards and fire protection, fireproofing materials, fire safety regulations and fire fighting equipment. Prevention and safety measures. Numerical Problems.

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Pre requisite: Oscillations.

Self-learning: Richterscale

08 Hours

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	Higher Semester	Statics and Dynamics Strength of Materials Thermodynamics Materials and Metallurgy Machine design Fluid Mechanics Hydraulics and Pneumatics Mechatronics Robotics Material Characterization	Basic fundamentals

6.0 Relevance to Real World


SL.No	Real World Mapping
01	The basic principle oscillations and shock waves
02	Basic fundamentals related to elastic materials.
03	Impact of Noise in Multi-storied buildings.
04	The basic principle of communication is done with optical fibers
05	Basic fundamentals related Instrumentation techniques are discussed.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Chalk and Talk	This delivery method is adapted to all modules.
02	Self prepared PPTs	The PPTs are also used in the discussions wherever necessary in the syllabus.
03	Self Prepared videos	Self prepared videos are also used for better understanding.
04	Experimental Demonstration	Experimental Demonstration is done to the students for better understanding of concepts.
05	Tutorial	Topic: Module I to Module V
06	NPTEL	Engineering Physics Videos

8.0 Books Used and Recommended to Students

Suggested Text Books

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Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)


1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A Textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition
9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.
10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P
11. Natural Hazards, Edward Bryant, Cambridge University, Press, 2nd Edition
12. Natural Hazards by Ramesh .P. Singh, CRC Press, Taylor and Francis group.
13. Disaster Education and Management, Rajendra Kumar Bhandari, Springer, India 2014
14. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning , II Edition.

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

- Simple Harmonic motion: <https://www.youtube.com/watch?v=k2FvSzWeVxQ>
 Shock waves: <https://physics.info/shock/>
 Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk
 Stress- strain curves: <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>
 Stress curves: <https://www.youtube.com/watch?v=f08Y39UiC-o>
 Fracture in materials: <https://www.youtube.com/watch?v=x47nky4MbK8>
 Earthquakes: www.asc-india.org
 Earthquakes and Hazards: <http://quake.usgs.gov/tsunami>
 Landslide hazards: <http://landslides.usgs.gov>
 Acoustics: <https://www.youtube.com/watch?v=fHBpvMDFyO8>

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	International Journal of Engineering Science	https://www.journals.elsevier.com/international-journal-of-engineering-science
2	International Journal of Engineering Trends and Technology	http://ijettjournal.org/

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11.0 Laboratory Component

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- i) Exercise
- j) Demonstration
- k) Structured Inquiry
- l) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

List of Experiments

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modulus of the material of the given bar Single Cantilever.
9. Determination of the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations

(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

12.0 Examination Note


Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks. CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation

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of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

- The laboratory test (**duration 03 hours**) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all ques- tions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject(**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

13.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
1	1	Simple Harmonic motion (SHM), Differential equation for SHM (No derivation),	Chalk and Talk,		20
	2	Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation),	Chalk and Talk, Power-point Presentation		
	3	Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach).	Chalk and Talk,		
	4	Engineering applications of Damped oscillations Theory of Forced oscillations (Qualitative)	Chalk and Talk, Power-point Presentation		
	5	Resonance, Sharpness of resonance. Numerical Problem	Chalk and Talk,		
	6	Shock waves: Mach number and Mach Angle, Mach Regimes	Chalk and Talk,		



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	7	Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube,	Chalk and Talk, Power-point Presentation		
	8	Applications of Shock Waves, Numerical problems.	Chalk and Talk, Power-point Presentation		
2	9	Stress-Strain Curve, Stress hardening and softening.	Chalk and Talk,		20
	10	Elastic Moduli, Poisson's ratio,	Chalk and Talk,		
	11	Relation between Y , n and σ (with derivation),	Chalk and Talk		
	12	mention relation between K , Y and σ , limiting values of Poisson's ratio.	Chalk and Talk		
	13	Beams, Bending moment and derivation of expression,	Chalk and Talk		
	14	Cantilever and I section girder and their Engineering Applications,	Chalk and Talk		
	15	Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture,	Chalk and Talk		
	16	Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems	Chalk and Talk,		
3	17	Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time,	Chalk and Talk, Power-point Presentation		20
	18	Absorption power and Absorption coefficient, Requisites for acoustics in auditorium,	Chalk and Talk,		
	19	Sabine's formula (derivation)	Chalk and Talk,		
	20	Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures,	Chalk and Talk,		
	21	Sound Insulation and its measurements	Chalk and Talk		
	22	Noise and its Measurements	Chalk and Talk, Power-point Presentation		
	23	Impact of Noise in Multi-storied buildings.	Chalk and Talk, Power-point Presentation		
	24	Numerical Problems	Chalk and Talk,		



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4	25	Characteristic properties of a LASER beam, Interaction of Radiation with Matter,	Chalk and Talk, Power-point Presentation	20
	26	Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State	Chalk and Talk, Power-point Presentation	
	27	Requisites of a laser system, Semiconductor Diode Laser, Applications: LASER Range Finder,	Chalk and Talk, Power-point Presentation	
	28	LIDAR, Road Profiling, Bridge Deflection, Speed Checker, Numerical Problems.	Chalk and Talk	
	29	Optical Fiber: Principle and Structure, Propagation of Light,	Chalk and Talk	
	30	Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA,	Chalk and Talk, Power-point Presentation	
	31	Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses,	Chalk and Talk	
	32	Applications: Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor. Numerical Problems	Chalk and Talk	
5	33	Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquakeresistant measures).	Chalk and Talk, Power-point Presentation	20
	34	Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami)	Chalk and Talk, Power-point Presentation	
	35	Landslide (causes such as excess rain fall, geological structure, human excavation etc., types of land slide, adverse effects, engineering solution for landslides)	Chalk and Talk, Power-point Presentation	
	36	Forest Fires and detection using remote sensing	Chalk and Talk, Power-point Presentation	
	37	Fire hazards and fire protection.	Chalk and Talk, Power-point Presentation	

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	38	Fire proofing materials	Chalk and Talk, Power-point Presentation		
	39	Fire safety regulations and fire fighting equipment - Prevention and safety measures.	Chalk and Talk, Power-point Presentation		
	40	Numerical Problems	Chalk and Talk		

14.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Section of cryogenics	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 4 of the syllabus	10	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Material characterization and Instrumentation techniques	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 5 of the syllabus	12	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list

15.0 QUESTION BANK

MODULE: 1

Waves and Oscillations

21. Define simple harmonic oscillations . Derive the expression for differential equation for SHM and mention its solution .What is the expression for period of oscillation for a mass spring oscillator? Derive the expression for equivalent force constant for springs in series and parallel combination. mention the expression for period of its oscillation
22. What are damped vibrations/oscillations? Give the theory of damped vibrations/oscillations, and find the condition of heavy, critical and light damping
23. What are forced oscillations ? Obtain an expression for amplitude and phase of the body undergoing forced vibrations.
24. Discuss the dependence of amplitude and phase of a forced vibrations on the frequency of the applied external force
25. Define sharpness of resonance . Write a short note on Helmholtz resonator
26. Define mach number and distinguish between acoustic, ultrasonic, subsonic and supersonic waves
27. Explain the conservational laws of mass, momentum and energy
28. Explain the construction and working of Reddy shock tube experiment.
29. Explain the applications of shock waves



MODULE: 2

Elasticity

30. Define elasticity. Explain stress strain curve
31. Define stress and strain.
32. Define Young's modulus (Y), Bulk modulus(K) and Rigidity modulus(n).
33. With neat diagram explain stress strain curve for elastic materials.
34. Define Young's modulus (Y), Rigidity modulus(n) and Poisson's ratio and derive the relation between them
35. Explain different types of beams.
36. Mention the engineering applications of cantilever and I-section grider.
37. Explain different failure mechanism in the materials.
38. Define bending moment and derive the expression for bending moment with the help of neat sketch.
39. Classify the beams and give two applications.

MODULE: 3

Acoustics, Radiometry and Photometry:

11. Define acoustics and mention types of acoustics.
12. Define Reverberation and reverberation time
13. Explain Requisites for acoustics in auditorium,
14. Derive Sabine's formula (derivation
15. Give an account on measurement of absorption coefficient,
16. Explain the Factors affecting the acoustics and remedial measures,
17. Explain Sound Insulation and its measurements
18. Give brief account on Noise and its Measurements,.
19. Explain the relation between luminance and Radiant quantities
20. Discuss about reflectance and Transmittance, Photometry (cosinelaw and inverse square law).

MODULE-4

Lasers & Optical Fibers

13. What is laser? Explain the terms a) Induced absorption b) Spontaneous emission c) Stimulated emission. d) Metastable state and e) Population inversion.
14. Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein's coefficients.
15. Discuss the conditions to be met by an active system for laser action.
16. Describe the construction and working of a semiconductor laser.
17. Describe construction & working of semiconductor laser along with the applications.
18. With a neat diagram explain numerical aperture and ray propagation in an optical fiber.
19. Obtain an expression for N.A. and arrive at the condition for ray propagation through the fiber.
20. Explain the different types of optical fibers.
21. Describe point to point communication system using optical fibers with the help of block diagram.
22. Mention advantages and disadvantages of optical fiber communication over the conventional methods of communication.




MODULE-5


Applications of Physics in computing

11. Explain eathquake

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12. Give a brief account on Tsunami
13. Write short note on landslides.
14. Explain the forest fire and its excavation
15. Mention types of landslides
16. Explain fire hazards and its protection
17. Write a short note on fire proofing materials.
18. Write a short note on fire fighting equipments.
19. Mention the causes of tsunami.
20. Mention the causes of land slides.

Prepared by	Checked by		
			
Sri. V.M.Bhumannavar	Sri.V.M.Bhumannavar	HOD	Principal

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Subject Title	ELEMENTS OF ELECTRICAL ENGINEERING		
Subject Code	BEEE203	CIE Marks	50
Teaching hours/week(L:T:P:S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Exam Hours	03
CREDITS – 03			

FACULTY DETAILS:

Name: Prof. S. D. Hirekodi	Designation: Asst. Professor	Experience: 23Years
No. of times course taught(including present): 05	Specialization: Power Electronics	

FACULTY DETAILS:

Name: Prof. Sunita. S. Malaj	Designation: Asst Professor	Experience: 24 years
No. of times course taught:06	Specialization: Electronics & Telecommunication	

1.0 Prerequisite Subjects:

Sl. No	Basics required	Class	Subject
01	Basic knowledge of electrical quantities like voltage, current, power and circuit elements like resistor, capacitor & inductor.	PUC I/II	Physics
02	Algebraic equations and its simplification.	PUC I/II	Mathematics
03	AC Fundamentals	PUC-II	Physics


2.0 Course Objectives

- To explain the basic laws used in the analysis of DC circuits, electromagnetism.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain three phase circuits, balanced loads and measurement of three phase power.
- To explain the measuring techniques, measuring instruments and domestic wiring.
- To explain electricity billing, equipment and personal safety measures.

3.0 Course Outcomes

At the end of the course, student will be able to

	Course Outcome	RBT Level	POs
C118.1	Understand the concepts of DC circuits and Electromagnetism.	L2	1, 2, 3, 6, 7, 8, 12
C118.2	Understand the concepts of single phase AC circuits.	L2	1, 2, 3, 6, 7, 8, 12
C118.3	Analyze the concepts of Three phase AC circuits.	L2	1, 2, 3, 6, 7, 8, 12
C118.4	Understand the concepts of measurements and measuring Instruments	L2	1, 2, 3, 6, 7, 8, 12
C118.5	Explain the concepts of domestic wiring, electricity billing, circuit protective devices and personal safety measures.	L2	1, 2, 3, 6, 7, 8, 12
Total Hours of instruction			40

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4.0

Course Content

MODULE-1

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Fleming's rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.

MODULE-2

Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numerical.

MODULE-3

Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical.

MODULE-4

Measuring instruments: construction and working principle of Wheatstone's bridge, Kelvin's double bridge, Megger, Maxwell's bridge for inductance, Schering's bridge for capacitance, concepts of current transformer and potential transformer. (Only balance equations and Excluding Vector diagram approach) Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.


MODULE-5

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).

5.0

Relevance to Real World

SL. No	Real World Mapping
1.	Calculating branch current in the circuits, measurement of power, evaluating performance analysis of electric circuits, Use of Fuses and MCB.
2.	Installation of Electrical Earthing systems
3.	Understanding of Electric Safety measures and Electricity billing.

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6.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
1	Demonstration (Using Models, Charts and field visits)	Topic: 1) Visit to basic Electrical Engg. Lab to understand dc circuits, Single and three phase circuit configurations, measurement of power 2) Field visit of HT Substation, Power distribution control panel room and Generator to understand electricity billing and layout.

7.0 Books Used and Recommended to Students

Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended


Website and Internet Contents References

- <http://nptel.vtu.ac.in/econtent/BS.php>
- <https://www.electrical4u.com>

9.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	Journal of Electrical Engg.	http://www.jee.ro
2	Electrical4U	http://www.electrical4u.com

10.0 Examination Note

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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester- end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

Three Tests each of 20 Marks;

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

11.0 Course Delivery Plan



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Module	Lecture No.	Content of Lecture	% of Portion coverage
I	1.	Ohm's law and Kirchhoff's laws,	20
	2.	Analysis of series, parallel and series-parallel circuits.	
	3.	Power and energy.	
	4.	Faraday's Laws of Electromagnetic Induction	
	5.	Lenz's Law, Flemings rules, Statically and dynamically induced EMF	
	6.	Concepts of self and mutual inductance.	
	7.	Coefficient of Coupling. Energy stored in magnetic field.	
	8.	Simple Numerical.	
II	9.	Generation of sinusoidal voltage, frequency of generated voltage	20
	10.	Average value, RMS value, form factor and peak factor of sinusoidal voltage and currents.	
	11.	Phasor representation of alternating quantities.	
	12.	Analysis of R, L, C circuits with phasor diagrams	
	13.	R-L, R-C and R-L-C circuits with phasor diagrams	
	14.	Real power, reactive power, apparent power, and Power factor.	
	15.	Series, Parallel and Series-Parallel circuits.	
	16.	Simple Numerical.	
III	17.	Necessity and advantage of 3-phase system.	20
	18.	Generation of 3-phase power.	
	19.	Definition of phase sequence. Balanced supply and balanced load.	
	20.	Relationship between line and phase values of balanced star connections.	
	21.	Relationship between line and phase values of balanced delta connections.	
	22.	Power in balanced 3-phase circuits.	
	23.	Measurement of 3-phase power by 2-wattmeter method.	
	24.	Simple Numerical.	
IV	25.	Construction and working principle of whetstone's bridge	20
	26.	Kelvin's double bridge	
	27.	Megger	
	28.	Maxwel's bridge for inductance	
	29.	Schering's bridge for capacitance	
	30.	Concepts of current transformer and potential transformer.	
	31.	Domestic Wiring: Requirements, Types of wiring: casing, capping.	
	32.	Two way and three way control of load.	

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V	33.	Power rating of household appliances including air conditioners, PCs, laptops, printers, etc	20
	34.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff.	
	35.	Calculation of electricity bill for domestic consumers.	
	36.	Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.	
	37.	Electric Shock, Earthing and its types.	
	38.	Safety Precautions to avoid shock.	
	39.	Residual Current Circuit Breaker (RCCB)	
	40.	Earth Leakage Circuit Breaker (ELCB).	

12.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1:	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1	4	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.
2	Assignment 1:	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 2	6	Individual Submission in the standard format is expected	Books 1 and 2 of the text books..
3	Assignment 1:	Students study the Topics and write the Answers. Get practice to solve university questions	Module 3	8	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.
4	Assignment 2:	Students study the Topics and write the Answers. Get practice to solve university questions	Module 4	10	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.
5	Assignment 2:	Students study the Topics and write the Answers. Get practice to solve university questions	Module 5	12	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.



13.0

QUESTION BANK

MODULE-1

DC circuits

1. Explain ohms law and state its limitations.
2. How the voltage and current is divided in series, parallel and series-parallel circuits? Also state the advantages & limitations of these circuits.
3. Find current through all the branches of the network shown in fig1.below.
4. For the circuit shown in fig.2 Calculate, a) equivalent resistance between the supply terminals b) Current supplied by the source c) Power consumed by the 16 ohm resistor.

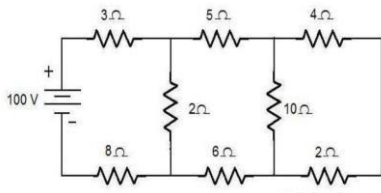


Fig.1

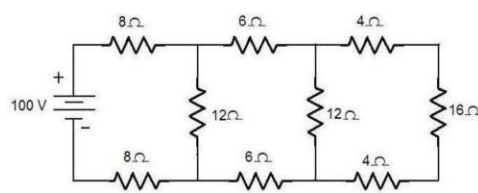


Fig.2

5. In the circuit shown in Fig3, determine the current through the 2 ohm resistor and the total current delivered by the battery. Use Kirchoff's laws.
6. In the network shown in fig 4, find the current delivered by the battery.

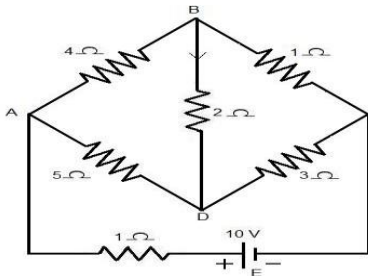


Fig.3

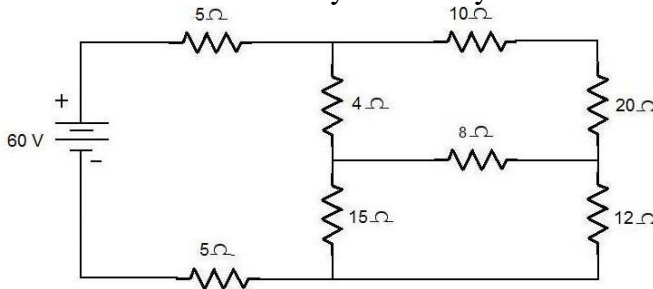


Fig.4

7. Find the unknown resistor R where power consumed by the network is 16W for the network shown in fig.5.
8. Find the currents I_1, I_2 and I_3 for the circuit shown in Fig.6. Also find potential difference between a and b.
9. Determine the potential difference between x and y. for the circuit shown in fig.7.

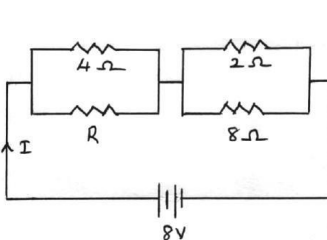


Fig.5

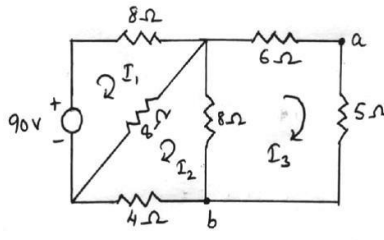


Fig.6

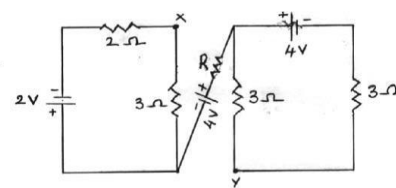
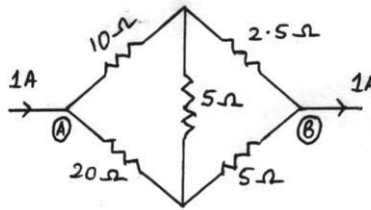


Fig.7

10. Find the currents in all the resistors of the network shown in the fig. Also find the potential at A w.r.t. that at B.




11. A resistance R is in series with a parallel combination of two resistances of $12\ \Omega$ and $8\ \Omega$. The total power dissipation in the circuit is $70\ \text{W}$ when the supply voltage is $20\ \text{V}$. Find R .
12. A current of $20\ \text{A}$ flows through two ammeters A and B in series. The p.d. across A is $0.2\ \text{V}$ and that across B is $0.3\ \text{V}$. Find how the same current will divide between A and B when they are in parallel.

MODULE -2

Single Phase Circuits

1. Define/Explain the following terms w.r.t alternating quantities: a) Phase & phase difference and b) Frequency and period.
2. Define and hence find the instantaneous value, peak value, RMS value, average value, formfactor and peak factor of alternating quantities.
3. With a neat schematic, explain the principle of generation of alternating voltage.
4. Explain the generation of single-phase AC induced emf with sinusoidal diagram.
5. The equation for an AC voltage is given as $V = 0.04\sin(200t + 60^\circ)\ \text{V}$. Determine the frequency, the angular frequency, instantaneous voltage when $t = 160\ \mu\text{s}$. What is the time represented by 60° phase angle?
6. Show that the average power consumed in a pure capacitor and in a pure inductor is zero.
7. Define power factor, explain its significance and establish the phase relationship between voltage and current in series and parallel combinations of a) RL circuit, b) RC circuit and c) RLC circuits (for different cases). Sketch the phasor diagrams and impedance diagrams in all the cases.
8. A coil when connected to $200\ \text{V}$, $50\ \text{Hz}$ supply takes a current of $10\ \text{A}$ and dissipates $1200\ \text{W}$. Find the resistance & reactance of the coil. Find also the real power, reactive power and overall power. Sketch the phasor diagram.
9. A coil of $50\ \Omega$ and $0.5\ \text{H}$ is connected across $200\ \text{V}$, $50\ \text{Hz}$ supply. Find a) Inductive reactance, b) Circuit impedance, c) Supply current, d) Power factor, e) Phase angle, f) Voltages across R & L and g) Active, reactive and overall (apparent) power. Obtain expressions for voltage and current. Also sketch the complete phasor and vector diagrams.
10. A capacitor of $15\ \mu\text{F}$ is connected in series with a non-inductive resistance of $100\ \Omega$ across a $100\ \text{V}$, $50\ \text{Hz}$ supply. Find a) Capacitive reactance, b) Impedance, c) Current, d) Power factor, e) Phase angle, f) Voltages across R & C and g) Power dissipated. Obtain expressions for voltage and current. Also sketch the phasor diagrams.
11. An RLC series circuit has the following data. $R = 25\ \Omega$; $L = 150\ \text{mH}$; $C = 20\ \mu\text{F}$; $250\ \text{V}$ $50\ \text{Hz}$ supply. Determine the supply current and the various voltage drops. Represent them in a phasor diagram.
12. A choke is connected in series with a non-inductive resistor across a $250\ \text{V}$, $50\ \text{Hz}$ supply. It draws a current of $5\ \text{A}$. The voltage across the coil and the non-inductive resistance are $125\ \text{V}$ & $200\ \text{V}$

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- respectively. Find: a) R , X , Z & Y , b) Power loss in the coil, and c) Total power supplied. Sketch the phasor and impedance diagrams.
13. Two impedances $Z_1 = (150 - j157) \Omega$ & $Z_2 = (100 + j100) \Omega$ are connected in parallel across a 200V, 50Hz supply. Find a) Branch currents, b) Total current and c) Complex power, and d) Total power. Sketch the complete phasor and admittance diagrams.
14. An ac generator with an internal impedance of $(3 + j2.4) \Omega$ is connected to load impedance consisting of two impedances $(12 + j10) \Omega$ & $(16 - j12) \Omega$ in parallel. If the supply voltage is 100V, Determine a) the current in each branch, b) the power in each branch
15. Show that in a pure inductor the current lags behind the voltage by 90° . Also draw the voltage and current waveforms.

MODULE-3


Three Phase Circuits:

- With a schematic, explain the principle of generation of 3-phase emf. What are the characteristics of balanced supply? When is a load said to be balanced? Establish the relationship between the phase & line currents and voltages in a 3-phase delta. In the case of balanced supply and load, (a) are the phase voltages equal? (b) are the line currents equal? Justify your answers. Sketch the complete phasor diagrams in every case.
- Explain the concept of „phase sequence“. Establish the relationship between the phase & line currents and voltages in a 3Φ star with 3-wire and 4-wire systems. In the case of balanced supply and balanced load, (a) are the line voltages equal? (b) are the phase currents equal? Justify your answers. Sketch the complete phasor diagrams in every case.
- Show with a relevant phasor diagram how 3-phase power can be measured by two wattmeters.
- Two wattmeters are used to measure the power in a 3Φ balanced system. What is the power factor when a) both the meters read equal, b) one meter reads twice the other, c) one meter reads zero and d) one meter reads negative?
- What are the advantages of a 3Φ system over a single-phase system?
- Three coils each of impedance $20 \angle 60^\circ \Omega$ are connected in star across a 400V, 3Φ , 50Hz supply. Find the reading on each of the two wattmeters connected to measure the power input. If the same impedances were connected in delta across the same supply, find the corresponding readings of the wattmeters. Find the reactive power and the apparent power.
- A balanced 3phase star connected load of 150kw takes a leading current of 100A with a line voltage of 1100V, 50Hz. Find the circuit constants of the load per phase.
- A 400V, delta connected 75 HP induction motor operates at 85% efficiency at 0.8pf. Find the readings of the wattmeters connected to measure power by the two-wattmeter method.

MODULE-4

Measuring instruments:

- Explain the construction and working of whetstone's bridge
- Explain the construction of Maxwel's bridge for measurement of inductance.
- Explain the construction and working of Schering's bridge for measurement of capacitance.
- Write short note on current transformer and potential transformer.
- Explain the construction and working principle of Megger

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Domestic wiring:

1. What are the requirements of domestic wiring system?
2. Mention the various types of wiring.
3. Explain casing-capping wiring with neat diagram.
4. Explain two way control of load with neat circuit diagram and truth table.
5. Explain three way control of load with neat circuit diagram and truth table.

MODULE5

Electricity bill:





1. What do you understand by Tariff? Discuss the objectives of Tariff.
2. Describe the desirable characteristics of a tariff.
3. Explain two part tariff.
4. A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10aise per kWh, Find the overall cost per kWh.
5. What is the unit for measure for electricity consumption?
6. What do you understand by term "unit" w.r.t. consumption of electrical energy.


Equipment Safety measures:

1. What is fuse? Discuss the advantages and disadvantages of a fuse.
2. What are desirable characteristics of fuse element.
3. Define and explain the following terms
i) Fusing current ii) Cut off current iii) Operating time iv) Breaking capacity
4. Explain the term „fusing factor“ with respect to fuse element.
5. Explain the working principle of fuse and MCB. Also discuss their merits and demerits.
6. Write a short note on difference between fuse and miniature circuit breaker w.r.t. protection of electrical installation.

Personal Safety measures

1. What is the need of earthing in electrical installation?
2. What is earthing? Why earthing is required?
3. With the help of neat sketch, explain plate earthing.
4. With the help of neat sketch, explain pipe earthing.
5. Write a short note on precautions against electric shock.
6. What is electric shock? What are the precautions to be taken to prevent electric shocks?

Prepared By	Checked By		
		 30-5-23	
Shri. S.D.Hirekodi.	Smt. H R Zinage	HOD	Principal

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Subject Title	ELEMENTS OF MECHANICAL ENGINEERING		
Subject Code	BEMEM203	IA Marks(20)+Assignments(10)+ laboratory work (20)	50
Number of Lecture Hrs / Week	2+2 hrs	Exam Marks(appearing for)	50(100)
Total Number of Lecture Hrs	40	Exam Hours	03
CREDITS – 03			

FACULTY DETAILS:

Name: Dr. K. M. Akkoli	Designation: Associate Professor	Experience: 20Years
No. of times course taught: 02	Specialization: Thermal Power Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Students should have the knowledge of basic subjects	PUC	Mathematics, Physics and chemistry

2.0 Course Objectives


Students belonging to all branches of Engineering are made to learn certain fundamental topics related to the mechanical engineering field so that they will have a minimum understanding and working of mechanical systems, equipment and process.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to understand construction and working mechanical systems.

CO'S	Course Outcome	Cognitive Level	POs
C114.1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources	L1,L2&L3	PO1, PO2,PO3
C114.2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, and refrigeration.	L1,L2&L3	PO1, PO2,PO3
C114.3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics	L1,L2&L3	PO1, PO2,PO3
C114.4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.	L1,L2&L3	PO2, PO3
C114.5	Apply the skills in developing simple mechanical elements and processes	L1,L2&L3	PO1, PO2,PO3
Total Hours of instruction		40	

4.0 Course Content

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Module - 1

Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Steam Formation and Application: Modes of heat transfer, Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems).

Energy Sources and Power Plants: Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant. **8 Hour**

Module- 2

Machine Tool Operations: Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest, Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,

Milling Machine: Working and types of milling machine, milling operations: plane milling, end milling and slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing. **8 Hours**

Module- 3

Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical).

Introduction to Refrigeration and Air Conditioning: Principle of refrigeration, Refrigerants and their desirable properties. Working principle of VCR refrigeration system, working principle of room air conditioner & Applications of air Conditioners

8 Hours

Module- 4

Mechanical Power Transmission:

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio (simple numerical problems)

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding and Fusion welding. **8 Hours**

Module- 5

Insight into future mobility technology; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Joints & links, Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection. **8 Hours**

5.0 Relevance to future subjects

Sl. No	Semester	Subject	Topics
01	VIII	Project work	Fundamental concepts
02	V/VI	Design of Machine Elements I/II	Fasteners, Keys and Joints, Rivets and Assembly drawings
03	III/IV	Basic Thermodynamics, Machine tool operations, Metal casting and welding, Material science & Advanced Thermodynamics	Internal combustion engines, gas cycles, Turbines, Refrigeration & air conditioning, Machine Tools, Machining processes, Iron carbide diagram.

6.0 Relevance to Real World

SL.No	Real World Mapping
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01	Electricity generation, Energy harnessing, Industrial automation, Robots configuration, machining operations,
02	Working and operation of IC engines, boilers, turbines, Air-conditioner, Refrigerator, Welding, brazing, soldering.
03	Selections of composite and engineering materials.

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	NPTEL Tutorial	Topic: Energy resources, internal combustion engines, Turbines, Automation and Robotics.

8.0 Books Used and Recommended to Students


Suggested Books	
Test Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008	
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.	
Reference Books	
1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012	
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.	
3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1	
Additional Study material & e-Books	
1. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill 2nd Ed., 2002	
2. Standard Handbook of Machine Design, Joseph E Shigley; Charles R Mischke, Thomas H Brown, Jr., McGraw-Hill, New York, 2004.	
3. Thermal Management in Electronic Equipment, HCL Technologies, 2010	
4. Thermal Management of Microelectronic Equipment, L. T. Yeh and R. C. Chu, ASME Press, New York, 2002	
5. Fundamentals of Robotics: Analysis and Control, Robert J. Schilling, Pearson Education (US).	

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References
https://www.tlv.com/global/TI/steam-theory/principal-applications-for-steam.html • https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam • https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/ • Videos Makino (For Machine Tool Operation)
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
1. Visit to any manufacturing/aero/auto industry or any power plant
2. Demonstration of lathe/milling/drilling/CNC operations
3. Demonstration of working of IC engine/refrigerator
4. Demonstration of metal joining process
5. Video demonstration of latest trends in mobility/robotics

10.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	website
1	Elsevier	https://www.journals.elsevier.com

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2	Journal of Composite Materials	http://journals.sagepub.com
3	Journal of Manufacturing Science and Engineering	http://manufacturing-science.asmedigitalcollection.asme.org
4	International Journal of Renewable Energy Research (IJRER)	http://www.ijrer.org

11.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

Three Tests each of 20 Marks;

1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.

Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks. If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	% of Portion
1	1	Introduction to Mechanical Engineering (Overview only): Role of Mechanical Engineering in Industries and Society	Chalk and Talk, Power-point Presentation	20%
	2	Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.	Power-point Presentation	
	3	Modes of heat transfer	Chalk and Talk	
	4	Steam formation, Types of steam, Steam properties and	Chalk and Talk	
	5	Applications of steam	Power-point Presentation	

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	6	Simple numerical problems	Chalk and Talk	
	7	Energy Sources and Power Plants: Basic working principles of Hydel power plant,	Video demonstration or Simulations,	
	8	Thermal power plant, nuclear power plant, solar power plant, Tidal power plant and Wind power plant	Video demonstration or Simulations,	
2	9	Machine Tool Operations: Lathe: Principle of working of a center lathe,	Chalk and Talk, Power-point Presentation	40%
	10	lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest,	Chalk and Talk, Power-point Presentation	
	11	Drilling Machine: Working of simple drilling machine, drilling operations: drilling,	Chalk and Talk, Power-point Presentation	
	12	boring, reaming, tapping, counter sinking, counter boring,	Chalk and Talk, Power-point Presentation	
	13	Milling Machine: Working and types of milling machine, milling operations:	Power-point Presentation	
	14	Plane milling, end milling and slot milling.	Power-point Presentation	
	15	Introduction to Advanced Manufacturing Systems: Introduction, components of CNC	Power-point Presentation	
	16	Advantages and applications of CNC, 3D printing.	Video demonstration or Simulations,	
3	17	Introduction to IC Engines: Components and working principles, 4-Stroke Petrol	Chalk and Talk	60%
	18	Components and working principles, 4-Stroke Petrol Diesel engines,	Chalk and Talk, Power-point Presentation	
	19	Application of IC Engines, performance of IC engines	Power-point Presentation	
	20	Simple numerical	Power-point Presentation	
	21	Introduction to Refrigeration and Air Conditioning: Principle of refrigeration,	Chalk and Talk, Power-point Presentation	
	22	Refrigerants and their desirable properties.	Chalk and Talk	
	23	Working principle of VCR refrigeration system,	Chalk and Talk, Power-point Presentation	
	24	Working principle of room air conditioner & Applications of air Conditioners	Chalk and Talk	
4	25	Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio,	Power-point Presentation	80%
	26	simple and compound gear trains	Power-point Presentation	
	27	Simple numerical problems	Power-point Presentation	
	28	Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio	Chalk and Talk	
	29	Simple numerical problems	Power-point Presentation	
	30	Joining Processes: Soldering, Brazing and Welding	Power-point Presentation	

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5	31	, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames),	Chalk and Talk	100%
	32	TIG welding, MIG welding and Fusion welding.	Power-point Presentation	
	33	Insight into future mobility technology;	Chalk and Talk	
	34	Electric and Hybrid Vehicles,	Power-point Presentation	
	35	Components of Electric and Hybrid Vehicles.	Power-point Presentation	
	36	Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.	Power-point Presentation	
	37	Introduction to Mechatronics and Robotics:	Chalk and Talk, Power-point Presentation	
	38	open-loop and closed-loop mechatronic systems.	Power-point Presentation	
	39	Joints & links, Robot anatomy,	Chalk and Talk	
40	Applications of Robots in material handling, processing and assembly and inspection.	Chalk and Talk		

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Introduction to Mechanical Engineering, Steam Formation and Application, Energy Sources and Power Plants,	Students study the Topics and prepare the multiple choice questioner with answer.	Module-1 of the syllabus	3	Group Activity. Each group should prepare minimum 05 questions expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Fundamentals of Machine Tools and Operations, Introduction to Modern Manufacturing Tools and Techniques, Introduction to Mechatronics 3D printing.	Students study the Topics and explain machining operations on lathe, milling & drilling machines.	Module-2 of the syllabus	6	Individual Activity.	Book 1, 2 of the reference list. Website of the Reference list
3	Assignment 3: University Questions on Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, performance of IC engines Introduction to Refrigeration and Air	Students study the Topics and identify parts of internal combustion engines and using Prototype Models Topics and identify different components of refrigerator and air-conditioning system,	Module-3 of the syllabus	9	Individual Activity. Welded job is expected.	Book 1, 2 of the reference list. Website of the Reference list

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	Conditioning:					
4	Assignment 4: University Questions on Mechanical Power Transmission and metal joining processes	Students study the Topics and perform welding, soldering, brazing and gas welding operations.	Module-4 of the syllabus	12	Group Activity	Book 1, 2 of the reference list. Website of the Reference list
5	Assignment 5: University Questions on Insight into future mobility technology; Introduction to Mechatronics and Robotics:	Students study the Topics and identify future mobility technology and robotics.	Module-5 of the syllabus	15	Group Activity	Book 1, 2 of the reference list. Website of the Reference list

15.0 QUESTION BANK

Module1:

1. What is the role of Mechanical Engineering in industry and society?
2. Describe emerging trends and technologies in different sectors such as energy, manufacturing, automotive aerospace and marine.
3. What are the mechanical industries contributions to GDP growth?
4. What are conventional and non-conventional energy sources? Name them. Also, list the differences between conventional & non-conventional energy sources.
5. write a short note of the following
6. a) Principles of electric power generation from hydropower plants,
7. b) Principle of operation of a typical windmill.
8. With suitable sketches explain the formation of steam at constant pressure.
9. Define the following terms regarding steam:
10. a) Sensible heat b) Latent heat c) Wet steam d) Dry saturated steam
11. e) Superheated steam f) Dryness fraction g) Degree of superheat.
12. Define the following properties of steam and also write their expressions for wet steam, dry saturated steam & superheated steam
13. Specific volume i) Enthalpy ii) Internal energy iii) External work of evaporation iv) Saturation temperature.


Module 2:

Define lathe. Explain the following machine tool operations with a neat sketch Turning, facing, knurling, thread cutting, Taper Turning by swivelling the compound rest,

14. Explain the drilling operations Drilling, Boring, Reaming, Tapping, Counter Sinking, Counter Boring
15. Explain the different milling operations and also explain up milling and down milling,
16. Give the classification of robots based on their configuration.
17. Discuss the advantages and disadvantages of polar and cylindrical robots with their applications
18. What is automation?
19. Explain programmable automation.
20. Explain CNC machine with block diagram.

Module 3:

1. What is an internal combustion engine? Classify I.C. Engines about an IC Engine define the following terms with a neat sketch. a) Bore b) Stroke c) Top or Inner dead centre d) Bottom or Outer dead centre e) Clearance volume f) Swept volume g) Compression ratio.
2. With a neat sketch of an IC Engine list its major components and state their function.
3. A pressure-volume diagram explains the operation of an Otto cycle.
4. A pressure-volume diagram explains the operation of a Diesel cycle.

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5. Explain the working of a four-stroke cycle petrol engine, with a neat sketch.
6. Explain the working of a four-stroke cycle Diesel engine, with a neat sketch.
7. What is refrigeration? Explain. Name different types of the refrigeration system.
8. Discuss the concepts (principles) involved in working a refrigeration system.
9. Define the coefficient of performance of a refrigerator.
10. Explain the unit of refrigeration.
11. With neat sketches explain the working of the vapour compression refrigeration cycle. Indicate the states of the refrigerant and its direction of flow.
12. What is a refrigerant? Name different refrigerants commonly used.
13. Discuss desirable properties of an ideal refrigerant.
14. What do you mean by air conditioning? Name different methods of air conditioning.

Module 4:

1. Classify the types of gears.
2. Explain spur gear arrangement.
3. Define open and closed belt drives.
4. Mention the advantages and disadvantages of belt drives.
5. Discuss in brief the methods of joining two metal pieces and explain their significance in fabrication.
6. What is flux concerning the metal joining process? Explain its significance.
7. Explain briefly the method of brazing. Discuss various types of solders and fluxes used.
8. Explain briefly the method of brazing. Discuss various types of filler materials and fluxes used.
9. Explain in the brief principle of the electric arc welding method with a simple sketch.
10. Name different types of fluxes used in electric arc welding.
11. With a simple sketch explain the construction of arc welding electrodes.
12. Explain in the brief principle of the oxy-acetylene gas welding method with a simple sketch.
13. With sketches explain the features of Neutral flame, Oxidizing flame & reducing flames.

Module 5:


1. Explain components of electric hybrid vehicles.
2. What are the advantages and disadvantages of EVs
3. Explain the anatomy of robots.
4. Explain robot configurations.
5. Explain different links of robots.
6. Applications of robots.

16.0 University Result

Examination	S ⁺	S	A	B	C	D	E	F	% Passing

Prepared by	Checked by		
Dr. K. M.Akkoli	Dr. S. N. Topannavar	HOD	Principal

Subject Title	Elements Of Civil Engineering & Mechanics		
Subject Code	22CIV14	IA Marks	50
Number of Lecture Hrs / Week	3	Exam Marks	50(100)
Total Number of Lecture Hrs	40	Exam Hours	03
CREDITS – 03			

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FACULTY DETAILS:		
Name: Preethi. R. Patil	Designation: Asst. Professor.	Experience: 4 yrs
No. of times course taught : 3	Specialization: Structural Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Civil Engineering	II	Elements of Civil Engineering & Mechanics

2.0 Course Objectives

1. Explain the Scope of different field of Civil Engineering and Role of Civil Engineer in the Infrastructural Development.
2. Describe the basic concepts of idealization, Principle of Physical Independence of forces, Principle of superposition of forces, Principle of transmissibility of forces.
3. Explain the system of coplanar concurrent & non-concurrent force system, moment and couple, Varignon's principle of moments
4. Explain the equilibrium of forces, Lami's theorem and equations of equilibrium to solve the Numerical problems. Understand the concept of friction (Static & Dynamic), Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose to solve the numerical.
5. Explain the types of supports, statically determinate and indeterminate beams, support reactions for beams subjected to point load, UDL and UVL
6. Analysis of simple trusses.
7. Centroid and Moment of Inertia of rectangular, circular and triangular areas from method of integration; Moment of inertia of composite areas.
8. Understand the concept of Dynamics –Kinematics- Laws of motion, rectilinear motion, curvilinear motion, super elevation and projectile motion. Kinetics – Application of D'Alembert's principal in plane motion and connected bodies including pulleys.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and use modeling software's to generate


	Course Outcome	Cognitive Level	POs
C203.1	Describing the basics of civil engineering, its scope of study, knowledge about roads, bridges and dams. Understanding the action of forces, moments and other loads on systems of rigid bodies.	L1,L2,L3	1,11,12
C203.2	Understanding the concept of equilibrium and friction- Static and Dynamic.	L1,L2,L3	1,2,11,12
C203.3	Analyzing and Interpreting the reactive forces and the effects those develop as a result of external loads on beams and trusses.	L1,L2,L3,L4	1,2,11,12
C203.4	Finding the centroid and moment of inertia of composite, plane and curved figures.	L1,L2,L3,L4	1,2,11,12
C203.5	Describing the basics of kinematics and kinetics, different types of motions. Analyzing the motion of the body	L1,L2,L3,L4	1,2,11,12
Total Hours of instruction		40	

4.0 Course Content

Course Syllabus

Module -1

Resultant of coplanar force system: Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force,

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Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

Module -2

Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples..

Module -3

Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

Module -4

Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.

Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples..

Module -5

Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion

Projectiles: Introduction, numerical examples on projectiles.

Kinetics: Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane Motion and connected bodies including pulleys, Numerical examples

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	Higher branches	Theory subjects	Basic fundamentals


6.0 Relevance to Real World

Sl.No	Real World Mapping
01	Basic Elements of Construction And Engineering Fields

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Module I-Module V
02	NPTEL	Fundamental of civil and mechanics Videos

8.0 Books Used and Recommended to Students

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Text Books

1. R.C. Hibbler, Engineering Mechanics, Principles of Statics and Dynamics, Pearson Press.
2. Bansal R. K., A text book of Engineering Mechanics, Laxmi Publications.
3. S.S. Bhavikatti, "Elements of Civil Engineering", New Age International Publisher, New Delhi, 4th edition 2009.

Reference Books

1. Suggested Learning Resources:
2. Books 1. R. C. Hibbler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press. 2. Bansal R. K., A Text Book of Engineering Mechanics, Laxmi Publications. 3. Andy Ruina and Rudra Pratap, Introducing to Statics and Dynamics, Oxford University Press. 4. Reddy Vijaykumar K and K Suresh Kumar, Engineering Mechanics. 5. F.P. Beer and E. R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill. 6. Irving H. Shames, Engineering Mechanics, Prentice-Hall.

Additional Study material & e-Books

1. Elements of Civil Engineering and Engineering Mechanics – Sawant and Nitsure

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

- [https://bookspare.com/\(https://www.tlv.com/global/TL/steam-theory/principal-applications-for-steam.html](https://bookspare.com/(https://www.tlv.com/global/TL/steam-theory/principal-applications-for-steam.html)
- <https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam>
- <https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/>
- Videos | Makino (For Machine Tool Operation)
- mechanisms and mechanical devices 4e.pdf (e-book- Mechanical Linkages)
- [https://vimeo.com/Boilermaker Videos > Videos,](https://vimeo.com/BoilermakerVideos/Videos)
<https://www.youtube.com/watch?v=zqXgmVnI3L8&list=PLE2DA184A2E479885>
- [https://www.youtube.com/watch?v=zwiFp3uQb5g,](https://www.youtube.com/watch?v=zwiFp3uQb5g) [www.triveniturbines.com/downloads-video-gallery.html,](http://www.triveniturbines.com/downloads-video-gallery.html)
[https://www.youtube.com/watch?v=4XNXDheMAo,](https://www.youtube.com/watch?v=4XNXDheMAo) [https://www.youtube.com/watch?v=sq6QjaNXoDE,](https://www.youtube.com/watch?v=sq6QjaNXoDE)
[https://www.youtube.com/watch?v=x5OD2KZXd54,](https://www.youtube.com/watch?v=x5OD2KZXd54) <https://www.youtube.com/watch?v=NIXsBcADDEK>
- http://www.uobabylon.edu.iq/uobColeges/ad_downloads/4_26634_460.pdf
- [https://en.wikipedia.org/wiki/Robotics,](https://en.wikipedia.org/wiki/Robotics) [https://www.youtube.com/watch?v=pLC4ISCBouM,](https://www.youtube.com/watch?v=pLC4ISCBouM)
<https://www.youtube.com/watch?v=br-ezdmEq7A>


10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Journal of engineering and technology	https://www.journals.elsevier.com/engineering-science-and-technology
2	International Journal of Solids and Structures	http://www.sciencedirect.com/science/journal/00207683

11.0 Examination Note

Assessment Details both (CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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Continuous Internal Evaluation(CIE):

Two Unit Tests each of 30 Marks (duration 01 hour 30 Minutes)

- First test after the completion of 30-40 % (after the completion of first two modules) of the syllabus
 - Second test after completion of 80-90% (after the completion of modules three and four) of the syllabus
- One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

Two assessments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assessment depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assessments, will be out of 100 marks and will be scaled down to 50 marks

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject **(duration 03 hours)**

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of **3 sub-questions**), should have a mix of topics **under that module.**

SCHEME OF EXAMINATION:

Question paper pattern:


- 1.The question paper will have **ten** full questions carrying equal marks.
2. Each full question consisting of **20** marks.
3. There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
4. Each full question will have sub question covering all the topics under a module.
5. The students will have to answer **five** full questions, selecting **one** full question from each module.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
		PART - A			
1	1	Basic dimensions and units	Chalk and Talk, Power-point Presentation	<i>Visit to an Industry using steam for their process and prepare a comprehensive</i>	20%
	2	Idealizations, Classification of force system			
	3	principle of transmissibility of a force			
	4	composition of forces, resolution of a force			
	5	Free body diagrams, moment, Principle of moments			




	6	Couple, Resultant of coplanar concurrent force system		<i>report</i>	
	7	Resultant of coplanar non-concurrent force system,			
	8	Numerical examples.			
2	9	Equilibrium of coplanar concurrent force system, Lami's theorem.	Chalk and Talk, Power-point Presentation		40%
	10	Equilibrium of coplanar parallel force system,			
	11	types of beams, types of loadings			
	12	Types of supports, ,			
	13	Equilibrium of coplanar non-concurrent force system subjected to			
	14	support reactions of statically determinate beams..			
	15	support reactions of statically determinate beams various types of loads			
3	16	Numerical examples			60%
	17	Introduction			
	18	Classification of trusses			
	19	analysis of plane perfect trusses by the method of joints and method of sections			
	20	Numerical examples			
	21	Introduction			
	22	laws of Coulomb friction, equilibrium of blocks on horizontal plane			
4	23	equilibrium of blocks on inclined plane	Chalk and Talk, Power-point Presentation		80%
	24	ladder friction, wedge friction Numerical examples			
	25	Introduction, Locating the centroid of rectangle, triangle			
	26	Locating the circle, semicircle			
	27	quadrant and sector of a circle using method of integration			
	28	centroid of composite areas and simple built up sections, Numerical examples			
	29	Introduction, Rectangular moment of inertia			
5	30	radius of gyration, parallel axes theorem, perpendicular axis theorem			100%
	31	moment of inertia of rectangular, triangular and circular areas from the method of integration			
	32	composite areas and simple built up sections,, Numerical examples			
	33	Linear motion: Introduction,			
	34	Displacement, speed, velocity,			
	35	acceleration, acceleration due to gravity			
	36	Numerical examples on linear motion			
	37	Projectiles: Introduction, numerical examples on projectiles.			

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	38	Introduction	
	39	D 'Alembert's principle of dynamic equilibrium	
	40	D Alembert principle application in-plane Motion connected bodies including pulleys, Numerical examples	

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Section of Introduction to Civil Engineering, Scope of different fields of Civil Engineering	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1 of the syllabus	2	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on Concurrent Force System: Composition of forces - Definition of Resultant; Composition of coplanar - concurrent force system, Parallelogram Law of forces.	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 2 of the syllabus	4	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
3	Assignment 3: University Questions on Equilibrium of Concurrent and Non-concurrent Forces Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem;	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 3 of the syllabus	6	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
4	Assignment 4: Centroids Introduction to the concept, centroid of line and area, centroid of basic geometrical figures.	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 4 of the syllabus	8	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
5	Assignment 5: University Questions on Definitions Displacement Average velocity Instantaneous velocity Speed Acceleration Average acceleration – Variable acceleration.	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 5 of the syllabus	10	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
6	Mini Project Rivets based for the students	Students study the Rivets applications from Real	Syllabus with Real	12	Group Activity.	All Books / paper Resources

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groups

World Example view.
Gain Knowledge of
Rivets Applications.

World
Mapping

Student Group / Study
need to Material. All
perform Internet / Web
Project and do resources.
a brief Report

14.0

QUESTION BANK

MODULE I

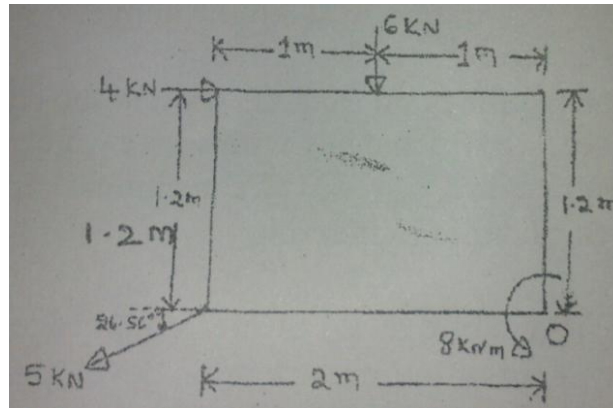
- Briefly explain the role of civil engineers in the infrastructural development.
- In the triangle ABC, a force at 'A' produces a clockwise moment of 90KN-m at B and an anticlockwise moment of 45KN-m at C. Find the magnitude and direction of the force.
- 3 Explain the following with neat sketches
- Write short notes on i) Shoulders. i i) Kerbs
- Discuss briefly the impact of civil engineering infrastructural developments on the national economy and environment?

i) Structural engineering ii) Transportation Engineering. Write a note on the role of civil engineer in infrastructural development.

- A force of 200N is acting on a block as shown in fig. Find the component of force along the horizontal and vertical axis.
- State and explain principle of transmissibility of a force.
- State the Newton's three laws of the motion
- Define force and state its characteristics

COPLANAR CONCURRENT AND NON CONCURRENT FORCE SYSTEM

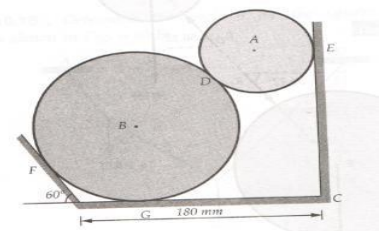
- Four co-planar forces acting at a point are shown in fig Q3 (a) . One of the forces is unknown and its magnitude is shown by 'P'. The resultant has a magnitude of 500N and is acting along the x-axis . Determine the unknown force 'P' and its inclination with x-axis.
 - State and prove Varignon's theorem of moment
 - State and prove parallelogram law of forces.
- Determine the magnitude, direction of the resultant force for the force system as shown in fig. Locate the resultant force with respect to point D. 26KN force is the resultant of the forces, one of which is as shown in fig. Determine the other force.
 - Explain the principle of resolved parts.
 - A truck is to be pulled along a straight road as shown in fig.
- Determine the magnitude, direction of the resultant force for the force system shown in fig. Determine the X intercepts of the resultant force with respect to the point O.



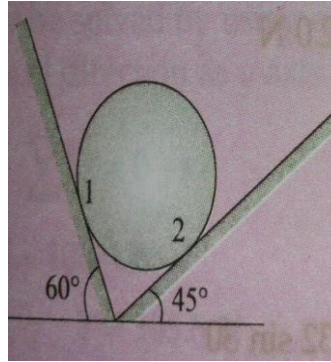
8. State and prove Varignon's theorem
9. The 26kN force is the resultant of two forces, one of which is shown in fig. Determine the other force
10. Determine the resultant force acting on the structure at point O both in magnitude and direction for the system of forces shown in fig.
11. Two forces F_1 and F_2 act upon a body. If the magnitude of their resultant is equal to that of F_1 and direction perpendicular to F_1 , then find the magnitude and direction of force F_2 . Take $F_1 = 20$ N
12. Determine the forces P, F and T required to keep the frame in equilibrium

MODULE II

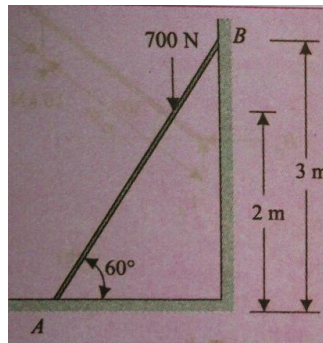
1. Determine the reactions at contact points for spheres A, B and C as shown in Fig. it is given that $W_A = W_B = 4$ kN, $d_A = d_B = 500$ mm, $d_C = 800$ mm
2. For the beam with loading shown in Fig. determine the reactions at the supports
3. State and prove Lami's theorem
4. A ladder of length 4m weighing 200N is placed against a vertical wall as shown in fig. The coefficient of friction between wall and the ladder is 0.2 and that between the floor and the ladder is 0.3. the ladder in addition to its own weight has to support a man weighing 600N at a distance of 3m from A. Calculate the minimum horizontal force to be applied at A to prevent Slipping. (Dec2014 /Jan 2015)
5. State laws of friction.
6. Two cylinders A and B rest in a channel as shown in fig. A has a diameter of 100mm and weighs 20 kN, B has diameter of 180 mm and weighs 50kN. The channel is 180mm wide at bottom with one side vertical and the other side at 60° inclinations. Find the



- reactions at contact points.
7. A 200 N sphere is resting in at rough as shown in fig. determine the reactions developed at contact surfaces. Assume all contact surfaces are smooth.

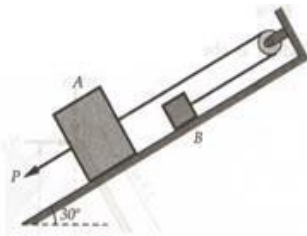


8. A ladder weighing 100N is to be kept in the position shown in figure. Resting on a smooth floor and leaning on a smooth wall. Determine the horizontal force required at floor level to prevent it from

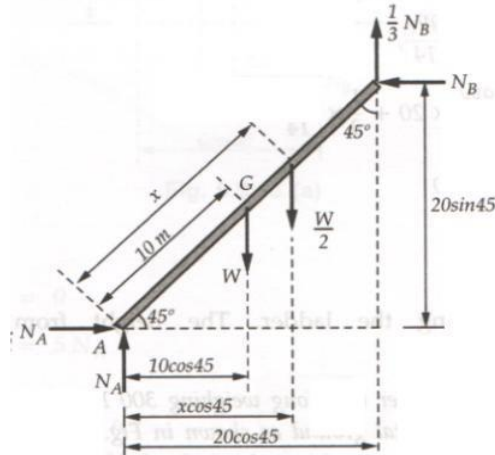


Slipping when a man weighing 700 N is at 2 m above floor level.

9. Determine the force P required to cause motion of blocks to impend. Take the weight of A as 90N and weight of B as 45 N. Take the coefficient of friction for all contact surfaces as 0.25 as in figure. Consider the pulley being frictionless.

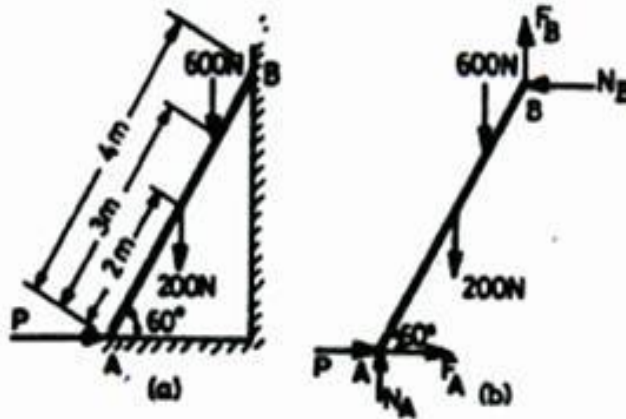


10. A uniform ladder of length 20m, rests against a vertical wall which it makes an angle of 45° , the coefficient of friction between the ladder and the wall and ground respectively being $\frac{1}{3}$ and $\frac{1}{2}$. If a man, whose weight is one half of the ladder, ascends the ladder, how high will he be, when the ladder slips?



11. State the laws of static friction.

12. A ladder of length 4m weighing 200N is placed against a vertical wall as shown in fig. The coefficient of friction between wall and the ladder is 0.2 and that between the floor and the ladder is 0.3. the ladder in addition to its own weight has to support a man weighing 600N at a distance of 3m from A. Calculate the minimum horizontal force to be applied at A to prevent Slipping. (June/July 2013, June 2012)

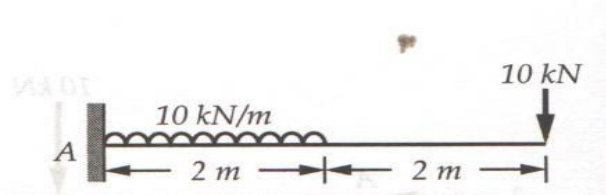
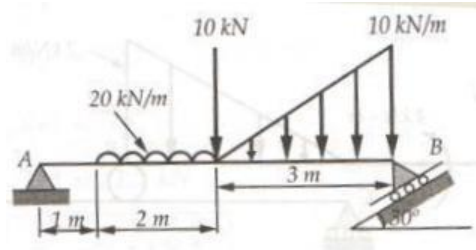


20. A block weighing 800 N rests on an inclined plane at 12° to the horizontal. If the coefficient of friction is 0.4, find the force required to pull the body up the plane, when the line of the force is (i) parallel to the plane (ii) horizontal

MODULE III

- Determine the position of 10 N loads on the beam such that reactions at the supports are equal for the beam loaded as shown in fig.
- Determine the reactions at the supports for the beam loaded as shown in fig.
- Determine the reactions at the ends of the beam AB and CD as shown in fig. Neglect the self weight of the beams.
- A beam ABCDE has a flexible link as shown in fig. determine the support reaction at A,D and E.

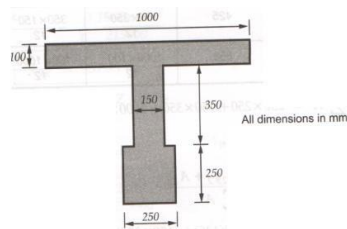
Find reactions for a cantilever beam shown in the figure.



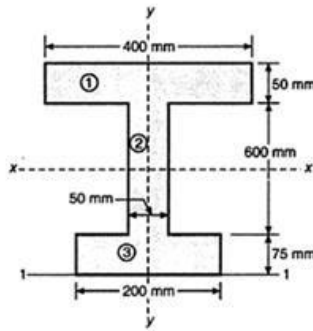
5. Explain Different types of supports? A ladder 5m in length is resting against a smooth vertical wall and a rough horizontal floor. The ladder makes an angle of 60° with the horizontal. When a man of weight 800N is at the top of the rung, what is the coefficient of friction required at the bottom of the ladder and the floor such that the ladder does not slip? Take the weight of the ladder as 200N.

MODULE IV

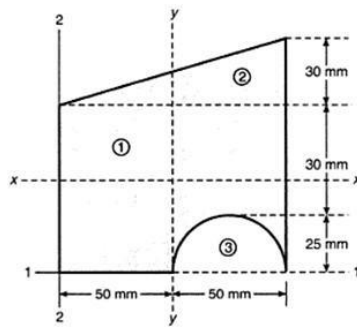
1. Determine the centroid of semi-circular lamina of radius 'R' by method of integration.
2. Determine the moment of inertia of the section shown in fig about its centroidal axes. Calculate the least radius of gyration for the section as well.
3. State and prove parallel axis theorem
4. Derive an expression for moment of inertia of a triangle with respect to horizontal centroidal axis.
Determine the centroid of a triangle by method of integration
5. Determine the centroid of the lamina shown in fig. wrt O.
6. Find the centroid of the shaded area shown in fig, obtained by cutting a semicircle of diameter 100mm from the quadrant of a circle of radius 100mm.
7. Locate the centroid of quadrant of a circular lamina from first principle.
8. The cross section of the prestressed concrete beam is as shown in the fig. Calculate the moment of inertia of this section about the centroidal axes parallel to the top edge and perpendicular to the plane of cross section. Also determine the radius of gyration.



9. Find the moment of inertia along the horizontal and vertical axis passing through the centroid of a section shown in fig.




10. Find the least radius of gyration about X-axis and Y-axis shown in fig.



MODULE V

1. What is centrifugal force? What is super elevation?
2. Determine the position at which the ball is thrown up the plane will strike the inclined plane as shown in fig. the initial velocity 30m/s and angle of projection is $\tan^{-1}(4/3)$ with horizontal. A stone is dropped from the top of the tower 50m high. At the same time another stone is thrown up from the tower with a velocity of 25m/sec. At what distance from the top and after how much time the two stones cross each other?
3. What is projectile? Define the following terms briefly i) Angle of projection ii) Horizontal range iii) Vertical height iv) Time of flight
4. A burglar's car starts at an acceleration of 2m/s². A police vigilant party came after 5s and continued to chase the burglar's car with a uniform velocity of 20m/s. find the time taken in which the police van will overtake the car.

Prepared by	Checked by		
Prof. Preethi.R.Patil	Prof. S.V.Jore	HOD	Principal

	S J P N Trust's Hirasugar Institute of Technology, Nidasoshi. <i>Inculcating Values, Promoting Prosperity</i>	First Year Engg.
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	Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE&ECE	Course Plan
		AY:2022-23 (Even)

Subject Title	INTRODUCTION TO ELECTRICAL ENGINEERING		
Subject Code	BESCK204B	CIE Marks	50
Teaching hours/week(L:T:P:S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Exam Hours	100
CREDITS – 03			

FACULTY DETAILS:		
Name: Dr. B. V. Madiggond	Designation: Professor & HOD	Experience: 29Years
No. of times course taught(including present): 21	Specialization: Power Electronics	

1.0 Prerequisite Subjects:

Sl. No	Basics required	Class	Subject
01	Basic knowledge of electrical quantities like voltage, current, power and circuit elements like resistor, capacitor & inductor.	PUC I/II	Physics
02	Algebraic equations and its simplification.	PUC I/II	Mathematics
03	AC Fundamentals	PUC-II	Physics

2.0 Course Objectives


- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors and induction motors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

3.0 Course Outcomes

At the end of the course, student will be able to

	Course Outcome	RBT	POs
C103.1	Understand the concepts of various energy sources and Electric circuits.	L2	1, 2, 3, 5, 6, 7, 8, 12
C103.2	Apply the basic Electrical laws to solve circuits.	L2	1, 2, 3, 4, 5, 6, 12
C103.3	Discuss the construction and operation of various Electrical Machines.	L2	1, 2, 3, 4, 5, 6, 7, 8, 12
C103.4	Identify suitable Electrical machine for practical implementation.	L2	1, 2, 3, 4, 6, 7, 8, 12
C103.5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.	L2	1, 2, 3, 5, 6, 7, 8, 11, 12
Total Hours of instruction			40

4.0 Course Content

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		Academics
		Course Plan
		AY:2022-23 (Even)

MODULE-1

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Power Generation: Hydrel, Nuclear, Solar & wind power generation (Block Diagram approach).

DC Circuits: Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

MODULE-2

A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions) Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).

Three Phase Circuits: Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)

MODULE-3

DC Machines:

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.

MODULE-4

Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical.


Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical

MODULE-5

Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB),

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		Academics
		Course Plan
		AY:2022-23 (Even)

merits and demerits.

Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

5.0 Relevance to Real World

SL. No	Real World Mapping
1.	Calculating branch current in the circuits, measurement of power, evaluating performance analysis of electric machines, Use of Fuses and MCB.
2.	Installation of Electrical Earthing and Power Supply scheme for transmission and distribution.
3.	Understanding of Electric Safety measures and Electricity billing.

6.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
1	Demonstration (Using Models, Charts and field visits)	Topic: 1) Visit to basic electrical engg. lab to understand dc circuits, Single and three phase circuit configurations, measurement of power and application of maximum power transfer theorem. 2) Visit to Electrical machines lab to observe the cut out section and actual machine parts. 3) Field visit of HT Substation, Power distribution control panel room and Generator to understand electricity billing and layout.

7.0 Books Used and Recommended to Students

Text Books:


1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

	S J P N Trust's Hirasugar Institute of Technology, Nidasoshi. <i>Inculcating Values, Promoting Prosperity</i> Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi Recognized under 2(f) & 12B of UGC Act, 1956 Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE&ECE	First Year Engg.
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- <http://nptel.vtu.ac.in/econtent/BS.php>
- <https://www.electrical4u.com>

9.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	Website
	Journal of Electrical Engg.	http://www.jee.ro
	Electrical4U	http://www.electrical4u.com

10.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

Three Tests each of 25 Marks;

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- The average of best two IAs will be considered for the CIE.
- If the nature of the courses requires assignments/Seminars/Quizzes/group discussion, etc, **TWO** evaluation components shall be conducted for 25 Marks each and average of this will be considered for CIE.

Total CIE marks will be 50 marks (IA + CCE)

Semester End Examination (SEE):

Only those students who satisfy the attendance and CIE requirement shall be eligible to appear for the SEE of that course.


Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.


11.0 Course Delivery Plan

Module	Lecture	% of
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Nidasoshi-591 236, Tq.: Hukkeri, Dist.: Belagavi, Karnataka, India.
 Phone: +91-8333-278887, Fax: 278886, Web: www.hsit.ac.in, E-mail: principal@hsit.ac.in

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			AY:2022-23 (Even)

No.	Content of Lecture	Portion coverage
I	1. Introduction: Conventional and non-conventional energy resources.	20
	2. General structure of electrical power systems using single line diagram approach.	
	3. Power Generation: Hydel, Nuclear.	
	4. Solar & wind power generation (Block Diagram approach).	
	5. DC Circuits: Ohm's Law and its limitations.	
	6. KCL & KVL, series, parallel.	
	7. Series-parallel circuits.	
	8. Simple Numerical	
II	9. A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude.	20
	10. phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)	
	11. Voltage and current relationship with phasor diagrams in R, L, and C circuits.	
	12. Concept of Impedance. Analysis of R-L series circuit.	
	13. Analysis of R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).	
	14. Three Phase Circuits: Generation of Three phase AC quantity, advantages and limitations.	
	15. star and delta connection, relationship between line and phase quantities (excluding proof)	
	16. Simple numerical.	
III	17. DC Machines: DC Generator: Principle of operation, constructional details.	20
	18. Induced emf expression, Relation between induced emf and terminal voltage. Simple numerical.	
	19. Types of generators.	
	20. DC Motor: Principle of operation, back emf and its significance.	
	21. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only).	
	22. Characteristics and speed control (armature & field) of DC motors (series).	
	23. Characteristics and speed control (armature & field) of DC motors (shunt).	
	24. Applications of DC motors. Simple numerical.	

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	Accredited at "A" grade by NAAC & Programmes Accredited by NBA: CSE&ECE		Course Plan
			AY:2022-23 (Even)

IV	25.	Transformers: Necessity of transformer, principle of operation,	20
	26.	Types and construction of single phase transformers.	
	27.	EMF equation, losses, variation of losses with respect to load. Efficiency	
	28.	Simple numerical.	
	29.	Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation.	
	30.	Constructional features of motor, types – squirrel cage and wound rotor.	
	31.	Slip and its significance	
	32.	Simple numerical	
V	33.	Domestic Wiring: Requirements, Types of wiring: casing, capping.	20
	34.	Two way and three way control of load.	
	35.	Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc	
	36.	Definition of "unit" used for consumption of electrical energy, two-part electricity tariff.	
	37.	Calculation of electricity bill for domestic consumers.	
	38.	Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.	
	39.	Personal safety measures: Electric Shock, Earthing and its types.	
	40.	Safety Precautions to avoid shock.	

12.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1:	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1	4	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.
		Students study the Topics and write the Answers. Get practice to solve university questions.	Module 2	6	Individual Submission in the standard format is expected	Books 1 and 2 of the text books..



2	Assignment 2:	Students study the Topics and write the Answers. Get practice to solve university questions	Module 3	8	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.
		Students study the Topics and write the Answers. Get practice to solve university questions	Module 4	10	Individual Submission in the standard format is expected	Books 1 and 2 of the text books.

13.0 QUESTION BANK

MODULE-1

Introduction and Power Generation

1. Explain about conventional and non-conventional energy sources.
2. With neat block diagram Hydrel power generation.
3. Explain nuclear power generation with neat block diagram.
4. Explain solar power generation with neat block diagram.
5. Explain wind power generation with neat block diagram.
6. Explain the general structure of electrical power systems using single line diagram.

DC circuits

7. Explain ohms law and state its limitations.
8. How the voltage and current is divided in series, parallel and series-parallel circuits? Also state the advantages & limitations of these circuits.
9. Find current through all the branches of the network shown in fig1.below.
10. For the circuit shown in fig.2 Calculate, a) equivalent resistance between the supply terminals b) Current supplied by the source c) Power consumed by the 16 ohm resistor.

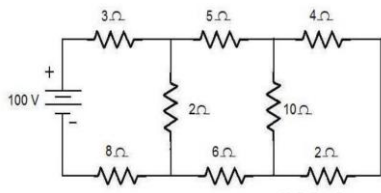


Fig.1

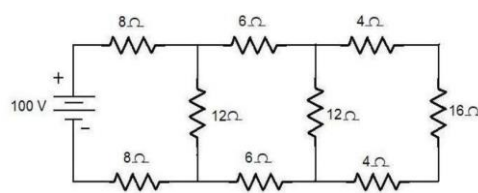


Fig.2

11. In the circuit shown in Fig3, determine the current through the 2 ohm resistor and the total current delivered by the battery. Use Kirchoff's laws.
12. In the network shown in fig 4, find the current delivered by the battery.

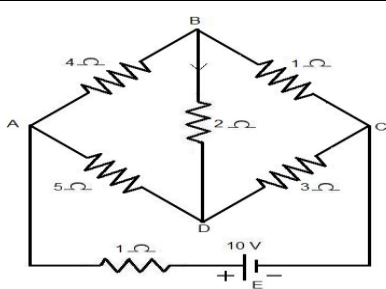


Fig.3

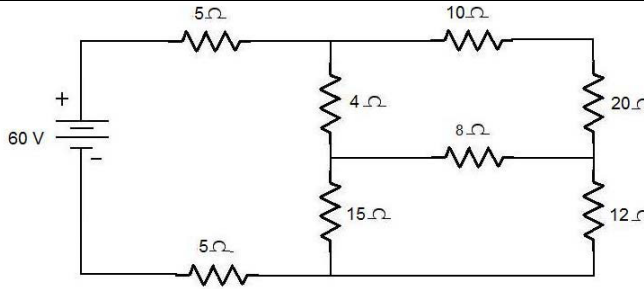


Fig.4

13. Find the unknown resistor R where power consumed by the network is $16W$ for the network shown in fig.5.
14. Find the currents I_1, I_2 and I_3 for the circuit shown in Fig.6. Also find potential difference between a and b .
15. Determine the potential difference between x and y . for the circuit shown in fig.7.

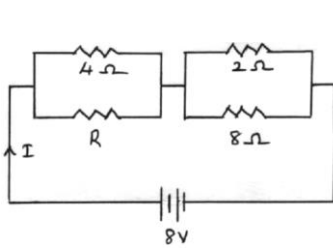


Fig.5

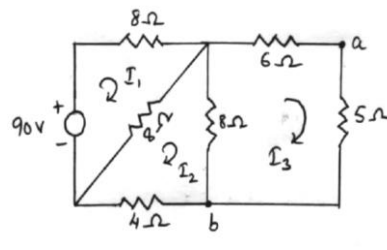


Fig.6

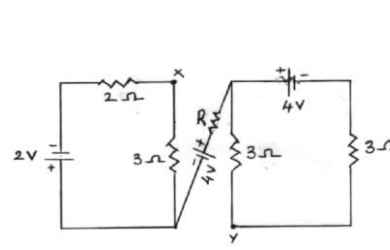
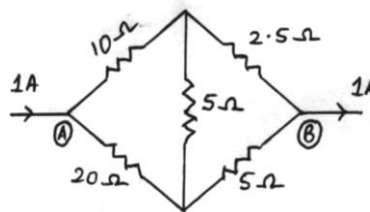


Fig.7

16. Find the currents in all the resistors of the network shown in the fig. Also find the potential at A w.r.t. that at B .




17. A resistance R is in series with a parallel combination of two resistances of 12Ω and 8Ω . The total power dissipation in the circuit is $70 W$ when the supply voltage is $20 V$. Find R .
18. A current of $20 A$ flows through two ammeters A and B in series. The p.d. across A is $0.2 V$ and that across B is $0.3 V$. Find how the same current will divide between A and B when they are in parallel.

MODULE -2

Single Phase Circuits


1. Define/Explain the following terms w.r.t alternating quantities: a) Phase & phase difference and b) Frequency and period.
2. Define and hence find the instantaneous value, peak value, RMS value, average value, form factor and peak factor of alternating quantities.
3. With a neat schematic, explain the principle of generation of alternating voltage.
4. Explain the generation of single-phase AC induced emf with sinusoidal diagram.
5. The equation for an AC voltage is given as $V = 0.04\sin(200t + 60^\circ)$ V. Determine the frequency, the angular frequency, instantaneous voltage when $t = 160\mu s$. What is the time represented by 60° phase angle?

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6. Show that the average power consumed in a pure capacitor and in a pure inductor is zero.
7. Define power factor, explain its significance and establish the phase relationship between voltage and current in series and parallel combinations of a) RL circuit, b) RC circuit and c) RLC circuits (for different cases). Sketch the phasor diagrams and impedance diagrams in all the cases.
8. A coil when connected to 200V, 50Hz supply takes a current of 10A and dissipates 1200W. Find the resistance & reactance of the coil. Find also the real power, reactive power and overall power. Sketch the phasor diagram.
9. A coil of 50Ω and $0.5H$ is connected across 200V, 50Hz supply. Find a) Inductive reactance, b) Circuit impedance, c) Supply current, d) Power factor, e) Phase angle, f) Voltages across R & L and g) Active, reactive and overall (apparent) power. Obtain expressions for voltage and current. Also sketch the complete phasor and vector diagrams.
10. A capacitor of $15\mu F$ is connected in series with a non-inductive resistance of 100Ω across a 100V, 50Hz supply. Find a) Capacitive reactance, b) Impedance, c) Current, d) Power factor, e) Phase angle, f) Voltages across R & C and g) Power dissipated. Obtain expressions for voltage and current. Also sketch the phasor diagrams.
11. An RLC series circuit has the following data. $R=25\Omega$; $L=150mH$; $C=20\mu F$; 250V 50Hz supply. Determine the supply current and the various voltage drops. Represent them in a phasor diagram.
12. A choke is connected in series with a non-inductive resistor across a 250V, 50Hz supply. It draws a current of 5A. The voltage across the coil and the non-inductive resistance are 125V & 200V respectively. Find: a) R , X , Z & Y , b) Power loss in the coil, and c) Total power supplied. Sketch the phasor and impedance diagrams.
13. Two impedances $Z_1 = (150 - j157)\Omega$ & $Z_2 = (100 + j100)\Omega$ are connected in parallel across a 200V, 50Hz supply. Find a) Branch currents, b) Total current and c) Complex power, and d) Total power. Sketch the complete phasor and admittance diagrams.
14. An ac generator with an internal impedance of $(3 + j2.4)\Omega$ is connected to load impedance consisting of two impedances $(12 + j10)\Omega$ & $(16 - j12)\Omega$ in parallel. If the supply voltage is 100V, determine a) the current in each branch, b) the power in each branch
15. Show that in a pure inductor the current lags behind the voltage by 90° . Also draw the voltage and current waveforms.

Three Phase Circuits:

16. With a schematic, explain the principle of generation of 3-phase emf. What are the characteristics of balanced supply? When is a load said to be balanced? Establish the relationship between the phase & line currents and voltages in a 3-phase delta. In the case of balanced supply and load, (a) are the phase voltages equal? (b) are the line currents equal? Justify your answers. Sketch the complete phasor diagrams in every case.
17. Explain the concept of 'phase sequence'. Establish the relationship between the phase & line currents and voltages in a 3Φ star with 3-wire and 4-wire systems. In the case of balanced supply and balanced load, (a) are the line voltages equal? (b) are the phase currents equal? Justify your answers. Sketch the complete phasor diagrams in every case.
18. Show with a relevant phasor diagram how 3-phase power can be measured by two wattmeters.
19. Two wattmeters are used to measure the power in a 3Φ balanced system. What is the power factor when a) both the meters read equal, b) one meter reads twice the other, c) one meter reads zero and d) one meter reads negative?
20. What are the advantages of a 3Φ system over a single-phase system?
21. Three coils each of impedance $20\angle 60^\circ\Omega$ are connected in star across a 400V, 3Φ , 50Hz supply. Find the

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reading on each of the two wattmeters connected to measure the power input. If the same impedances were connected in delta across the same supply, find the corresponding readings of the wattmeters. Find the reactive power and the apparent power.

22. A balanced 3phase star connected load of 150kw takes a leading current of 100A with a line voltage of 1100V, 50Hz. Find the circuit constants of the load per phase.
23. A 400V, delta connected 75 HP induction motor operates at 85% efficiency at 0.8pf. Find the readings of the wattmeters connected to measure power by the two-wattmeter method.

MODULE-3

DC Machines & DC Generators


1. Explain the principle of operation of a dc generator.
2. With a neat sketch explain the construction of a dc generator.
3. Derive the emf equation of a dc generator.
4. Explain the different types of dc generators & mention their applications.
5. A 4 pole, wave-wound dc generator has 50 slots and 24 conductors / slot. The flux/pole is 10mWb. Determine the induced emf in the armature if it is rotating at 600 rpm. Solve the same problem if the machine is lap-wound.
6. A 6 pole, wave-wound DC generator has 70 conductors & 12mWb flux/pole. Determine the speed of the armature if the induced emf is 400V. What will be the speed when it is lap wound and generating 400V?
7. A dc shunt generator supplies a load of 10kW at 250V. Calculate the induced emf if the armature resistance is 0.5Ω and shunt field resistance is 100Ω .
8. A shunt generator has an induced emf of 254V. When the machine is loaded the terminal voltage falls to 240V. Find the load current if the armature resistance and field resistance are 0.04Ω & 24Ω respectively. Brush contact drop is 1.5V/brush.
9. A dc long shunt compound generator delivers a load current of 200A at 500V. The resistance of armature, series field and shunt field are 0.03Ω , 0.015Ω & 15Ω respectively. Calculate the emf induced in the armature. Assume a brush drop of 1V per brush.

DC Motor

10. Explain the principle of operation of a dc motor.
11. Explain the significance of back emf of a dc motor. Derive an expression for the back emf.
12. Derive the torque equation of a dc motor.
13. Explain the different types of dc motors. Mention their applications.
14. Sketch and explain the following characteristics for series, shunt motors.
Torque vs. Armature current, and Speed vs. Armature current.
15. A 20kW, 200V dc shunt generator has a armature and field resistances of 0.05Ω and 150Ω respectively. Determine the total current and power developed when working as a motor taking 20kW power.
16. A 250V dc series motor has an armature resistance of 0.05Ω and field resistance of 0.02Ω . It runs at 900rpm taking 30A. Determine its speed when it takes a current of 25A.
17. A dc shunt motor runs at 950 rpm on 200V with 40A armature current. Its armature resistance is 0.8Ω . What resistance is required to be connected in the armature circuit to reduce the speed to 725 rpm without changing the armature current?

MODULE-4

Transformers

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1. Explain the construction & principle of operation of 1 Φ transformer. Derive the emf equation of a transformer.
2. What are the losses in a transformer? On what factors do they depend? How are losses reduced in a transformer by construction?
3. Explain with neat sketches the core and shell type transformers.
4. Define and explain the term *efficiency of a transformer*.
5. A 125kVA transformer has a primary voltage of 2000V at 60Hz with 182 & 40 turns on primary and secondary respectively. Neglecting the losses calculate a) no load secondary emf b) full load primary & secondary currents and c) flux in the core.
6. A 25kVA transformer has an efficiency of 97% both at FL and at half load at 0.8pf. Determine a) full load iron & copper loss, b) efficiency at 75% FL and c) max efficiency.
7. A 25kVA, 2200/250V transformer has an iron loss of 600W & full load copper loss of 1000W.
8. Calculate efficiencies at i) full load ii) 75% load iii) 50% load iv) 25% load at upf & 0.8pf lag,
9. v) Losses at max. Efficiency vi) load for max. Efficiency and vii) max. Efficiency at upf.
10. The iron and full load copper losses in a 40kVA, 1 Φ transformer are 450W & 850W respectively.
11. Find i) efficiency at full load, 0.8pf lag ii) max efficiency and iii) load at which the maximum
12. efficiency occurs.
13. A 50kVA transformer has an efficiency of 98% at full load 0.8pf and 97% at half load 0.9pf.
14. Determine the full load iron and copper losses. Find the load at which max. Efficiency occurs as
15. also the maximum efficiency.
16. Give reasons for the following: a) Core loss in a transformer remains almost constant b) A laminated steel core is used in a transformer.
17. List different types of loss in a transformer and explain each one in brief.
18. A 12 pole, 3 Φ alternator is coupled to an engine running at 500rpm. It supplies an induction motor which has a full load speed of 1440rpm. Find the percentage slip and the number of poles of the motor.

Three Phase Induction Motors:

19. Explain the principle of operation and constructional features of a 3 Φ induction motor.
20. Define and explain slip in an induction motor.
21. What are squirrel cage and wound-rotor induction motors? What are their relative advantages and disadvantages? Mention their applications.
22. A 3 Φ , 8 pole, 60Hz induction motor has a slip of 3% at full load. Find the synchronous speed and the frequency of rotor current at full load.
23. Explain the concept of rotating magnetic field and show that resultant flux remains same at different instants of time.


MODULE-5

Domestic wiring:

1. What are the requirements of domestic wiring system?
2. Mention the various types of wiring.
3. Explain casing-capping wiring with neat diagram.
4. Explain two way control of load with neat circuit diagram and truth table.
5. Explain three way control of load with neat circuit diagram and truth table.

Electricity bill:

6. What do you understand by Tariff? Discuss the objectives of Tariff.

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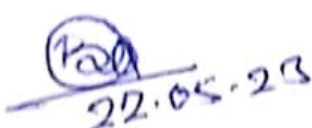
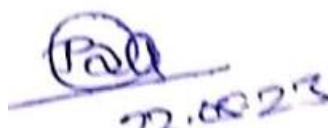
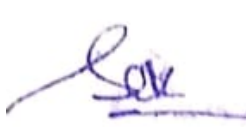
7. Describe the desirable characteristics of a tariff.
8. Explain two part tariff.
9. A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10aise per kWh, Find the overall cost per kWh.
10. What is the unit for measure for electricity consumption?
11. What do you understand by term "unit" w.r.t. consumption of electrical energy.

Equipment Safety measures:


12. What is fuse? Discuss the advantages and disadvantages of a fuse.
13. What are desirable characteristics of fuse element.
14. Define and explain the following terms
 i) Fusing current ii) Cut off current iii) Operating time iv) Breaking capacity
15. Explain the term 'fusing factor' with respect to fuse element.
16. Explain the working principle of fuse and MCB. Also discuss their merits and demerits.
17. Write a short note on difference between fuse and miniature circuit breaker w.r.t. protection of electrical installation.

Personal Safety measures

18. What is the need of earthing in electrical installation?
19. What is earthing? Why earthing is required?
20. With the help of neat sketch, explain plate earthing.
21. With the help of neat sketch, explain pipe earthing.
22. Write a short note on precautions against electric shock.
23. What is electric shock? What are the precautions to be taken to prevent electric shocks?

Prepared and Checked by		
 22.05.23	 22.05.23	
Dr. B. V. Madiggond	HOD	Principal

Introduction to C Programming			
Course Code	BESCK204E	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total marks(CIE + SEE)	100
Credits	03	SEE Hours	03
FACULTY DETAILS:			

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Name: Prof. S. S. Patil	Designation: Assistant Professor	Experience: 18Yrs
No. of times course taught: 10	Specialization: VLSI Design and Embedded Systems	
FACULTY DETAILS:		
Name: Prof. A. U. Neshti	Designation: Assistant Professor	Experience: 15Yrs
No. of times course taught: 01	Specialization: Digital Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	-	-	Basic Mathematics, Logic & Reasoning ability

2.0 Course Objectives

1. Understand fundamentals of computer and design efficient programs.
2. Learn about Operators in C, type conversion and typecasting, Decision control and Looping Statements.
3. Understand concepts of Function and Array.
4. Learn the concepts of two-dimensional arrays and Strings.
5. Understand about String taxonomy, operations on strings, pointers and structures.

3.0 Course Outcomes

At the end of the course the student will be able to:

CO	Course Outcome	RBT Level	POs
C134.1	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.	L1,L2	1,2,3,5,8,10
C134.2	Apply programming constructs of C language to solve the real-world problem	L1,L2,L3	1,2,3,5,8,10
C134.3	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting	L1,L2,L3	1, 2, 3,5,8,10
C134.4	Explore user-defined data structures like structures, unions and pointers in implementing solutions	L1,L2,L3	1, 2,3,5,8,10
C134.5	Design and Develop Solutions to problems using modular programming constructs using functions	L1,L2,L3	1, 2,3,5,8,10

4.0 Course Content


Module-1 (8 Hours of Pedagogy)

Introduction to C: Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,

Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14

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Module-2 (8 Hours of Pedagogy)

Operators in C, Type conversion and typecasting. Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

Textbook: Chapter 9.15-9.16, 10.1-10.6

Module-3 (8 Hours of Pedagogy)

Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions,

Textbook: Chapter 11.1-11.13, 12.1-12.6

Module-4 (8 Hours of Pedagogy)

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. Applications of arrays and introduction to strings: Applications of arrays, case study with sorting techniques. Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

Textbook: Chapter 12.7-12.12

Module-5 (8 Hours of Pedagogy)

Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables Structures: Introduction to structures

Textbook: Chapter 13.1-13.6, 14.1-14.3, 15.1

Lab Assignments:


1. C Program to find Mechanical Energy of a particle using $E = mgh + \frac{1}{2} mv^2$.
2. C Program to convert Kilometers into Meters and Centimeters.
3. C Program to Check the Given Character is Lowercase or Uppercase or Special Character
4. Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5. Implement Matrix multiplication and validate the rules of multiplication.
6. Compute $\sin(x)/\cos(x)$ using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
7. Sort the given set of N numbers using Bubble sort.
8. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9. Implement structures to read, write and compute average- marks and the students scoring above and below the average marks for a class of N students.
10. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.

5.0 Relevance to future subjects

S. No	Semester	Subject	Topics
01	II	C++/Java/Python Programming	Functions, Arrays, Structure
02	III	Data Structures & Applications	Arrays, Structure, union, pointers
03	IV	Design of Algorithms	Arrays, Structure, union, pointers,
04	VI	System Software and Compiler	Arrays, Structure, union, pointers,

6.0 Relevance to Real World

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S.No	Real World Mapping
01	Widely used and highly portable Language for building system as well as application software.

7.0 Gap Analysis and Mitigation

S. No	Delivery Type	Details
01	E-content	E-learning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
02	MOOC	https://nptel.ac.in/courses/106/105/106105171/

8.0 Books Used and Recommended to Students

Text Books	
1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.	
Reference Books	
1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.	
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.	
Additional Study material & e-Books	
1. C Tutorials –videos on YouTube	
2. E-learning- vtu.ac.in/econtent/courses/video/BS/15PCD23.html	
3. https://nptel.ac.in/courses/106/105/106105171/	
4. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html	
5. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.	

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References
1) https://nptel.ac.in/courses/106/105/106105171/

10.0 Magazines/Journals Used and Recommended to Students

S.No	Magazines/Journals	website
1	C/C++ Users Wiki Journal	https://en.wikipedia.org/
2	Electronics for You	https://electronicsforu.com/


11.0 Examination Note

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

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The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to 30 marks

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 05 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (duration 03 hours) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks. Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 20 marks.
- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecture	% of Portion
1	L1.	Introduction to C: Introduction to computers,	20
	L2.	Input devices	
	L3.	Output devices	
	L4.	Designing efficient programs	
	L5.	Introduction to C, Structure of C program	
	L6.	Files used in a C program	
	L7.	Compilers, Compiling and executing C programs	
	L8.	variables, constants, Input/output statements in C	
2	L9.	Operators in C	20
	L10.	Type conversion	
	L11.	Typecasting	
	L12.	Introduction to decision control	
	L13.	Conditional branching statements	
	L14.	iterative statements	
	L15.	nested loops	



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First Year Engg.

Academics

Course Plan

AY:2022-23 (Even)

	L16.	break and continue statements, goto statement.	
3	L17.	Functions: Introduction using functions	20
	L18.	Function definition, function declaration	
	L19.	Function call, return statement	
	L20.	passing parameters to functions	
	L21.	scope of variables, storage classes	
	L22.	recursive functions	
	L23.	Arrays: Declaration of arrays, accessing the elements of an array, storing	
	L24.	Operations on arrays, Passing arrays to functions	
4	L25.	Two dimensional arrays, operations on two-dimensional arrays	20
	L26.	Two-dimensional arrays to functions	
	L27.	multidimensional arrays.	
	L28.	Applications of arrays	
	L29.	Introduction to strings: Applications of arrays	
	L30.	Introduction to strings: Reading strings, writing strings,	
	L31.	Summary of functions used to read and write characters.	
L32.	Suppressing input using a Scanset.		
5	L33.	Strings: String taxonomy, operations on strings	20
	L34.	Miscellaneous string	
	L35.	Character functions	
	L36.	Arrays of strings.	
	L37.	Pointers: Understanding the Computer's Memory,	
	L38.	Introduction to Pointers	
	L39.	Declaring Pointer Variables	
L40.	Structures: Introduction to structures		


13.0

S.No.	Title	Outcome expected	Related Study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment-1: Introduction to C, Decision control and Looping statements, Functions (10 Marks)	Students study the Topic and write the Answers.	Module-1,2,3	4	Individual Activity.	Book 1 of the text book.
2	Assignment-2: Arrays, Strings, Pointers (10 Marks)	Students study the Topics and write the Answers.	Module-3,4,5	9	Individual Activity.	Book 1 of the text book.
3	Quiz/Seminar/GD (20 Marks)	Students study the Topics and answer the Quiz / present seminar.	Will be Notified later.	13	Individual/Group activity.	Book 1, 2 of the reference list.

14.0

QUESTION BANK

Module: 1

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- 1 What is Computer? List and explain the generations of Computer.
- 2 Draw a neat block diagram of Computer and explain.
- 3 List and explain the types of Computers based on size/Speed.
- 4 Draw a neat block diagram of Computer and explain
- 5 Differentiate between Primary memory and Secondary memory.
- 6 What is network? List and explain types of networks.
- 7 What is Software? Explain the two types of software with Examples.
- 8 Write basic structure of C program and explain its different sections.
- 9 What is constant? Explain different types of constants with examples.
- 10 Define variables. List the rules for naming variables.
- 11 What is data type? Explain the basic data types that are supported by C
- 12 What is data type? Explain the basic data types that are supported by C
- 13 What are the rules to be followed to declare an identifier with example?
- 14 Define C- tokens. List and explain different C- tokens.
- 15 Write a note on operator precedence and associativity.
- 16 What is formatted and unformatted input/output statement? Explain formatted and unformatted input/output statement with syntax and examples.
- 17 Explain printf() and scanf() function with an example.
- 18 Explain the getch(), gets() function with example.

Module -2

- 1 Give classification of operators in C, explain with examples.
- 2 Define expression. Explain different types of Expressions.
- 3 Write a C program that takes the radius of the circle and calculates the area and perimeter of circle.
- 4 Write a C program that takes from the user and calculates their sum and average.
- 5 Write a C program to print numbers from 4 to 9 and their squares using printf() function.
- 6 Write a C program to find out largest of three numbers.
- 7 Write a C program to find the largest of three numbers using conditional operators.
- 8 An Electric power distribution company charges its domestic customers as follows:

Consumption Units	Rate of charge
0 - 200	Rs 0.50 per units
201 – 400	Rs 100 + Rs 0.65 per unit excess of 200
401 – 600	Rs 230 + Rs 0.80 per unit excess of 400
601 - above	Rs 390 + Rs 1.00 per unit excess of 600

- Write a C program to compute and print amount to be paid by the customer.
- 9 Write the Syntax of different looping control constructs and explains their working.
 - 10 Distinguish between the following:
i) goto and if ii) break and continue
 - 11 Write the syntax of nested if ...else statement and explain its working.
 - 12 Differentiate between do...while and while loop, with the help of Syntax.
 - 13 Write a C program to calculate area of circle, rectangle and triangle using switch
 - 14 Write a C program to plot a Pascal's triangle by reading the value of n.
 - 15 Given an integer number, write a C program using while loop to reverse the digits of the number.
 - 16 Write a C program to compute the binomial coefficients by reading the value of n.
 - 17 Write a C program to find the factorial of a given number using while loop.
 - 18 Write a C program to find roots of quadratic equation ax^2+bx+c .
 - 19 Explain with syntax and example the switch case statement.
 - 20 Write a C program to find whether given no. is palindrome or not
 - 21 Write a C program to check whether the entered no. is prime or not.

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22 Explain the nesting of loops in C with examples.

Module- 3

- 1 What is array? How do you classify arrays? What are the advantages of arrays?
- 2 Explain the declaration and Initialization of 1-D and 2-D arrays with examples.
- 3 With an example, explain how the elements of two-dimensional arrays stored in row major and column major order.
- 4 Define string? Explain the string handling functions in C.
- 5 What is string? How are they declared and initialized? Explain with example.
- 6 Explain the following string library functions: i. strlen() ii. strcpy() iii. strcat()
- 7 Write a C program to compare two strings without using library function.
- 8 Write a C program that accepts a string at the runtime and checks whether string is palindrome or not.
- 9 Given a string. Write a C program to count the number of A's in that string. Do not use any built-in function.
- 10 Write a C program to find the largest element of an array of a given size.
- 11 Write a C program to find the number of positive, negative and zero elements in a given list of integers
- 12 Write a C program to find sum and average of N integer numbers using arrays.
- 13 Write a C program to find addition of two matrices.
- 14 Write a C program to find product of two matrices.
- 15 Write a C program to input 30 students' marks in a test through the keyboard. Compute and display average marks, highest marks and lowest marks.
- 16 Write a C program to search a given number in the list using Linear search.
- 17 Write a C program to search a key integer element in the given array of N elements using binary search Technique. Print the output with suitable headings.
- 18 Write a C program to sort the given numbers in ascending order using Bubble sort.
- 21 What is function? What are the needs of function? What are its advantages?
- 22 Explain the function declaration with a suitable example.
- 23 Explain the different types of functions with examples.
- 24 What are the elements of functions? Explain.
- 25 What are the different ways of passing parameters to functions? Explain
- 26 Distinguish between actual parameters and formal parameters.
- 27 Distinguish between local and global variables.
- 28 Write a program to find the sum of odd numbers up to 50 using function.
- 29 Write a C functions to find sum of individual digits of given a number.
- 30 What is recursive function? Write a C program to accept two positive integers and compute their GCD using a recursive function.
- 31 Write a C program to print numbers from 1 to n, which are divisible by 6, using a function.
- 32 Write a function to test whether or not a given integer number is prime. Write main () which reads the integer to be tested from keyboard and calls the function to test for primness
- 33 Write a C program to find sum, Average & standard deviation of n values using functions.
- 34 Write a C function to length of string and check whether the entered string is palindrome or not.
- 35 Write a C function to find sum of specified row, sum of specified column and sum of all the elements of a matrix.
- 36 Write a C function to search the given element in a list using linear search technique.
- 37 Write a C program to find nth Fibonacci number in the series using recursion.
- 38 Write a C program to find the factorial of a positive integer using function.

Module- 4



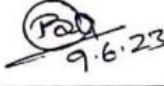

- 1 Write a C program to sort the given numbers in ascending order using Selection sort.
- 2 Write a C program to find length of a string without using strlen() function.
Write a program in C to separate the individual characters from a string.
- 3 Write a program in C to print individual characters of string in reverse order.
- 4 Write a program in C to compare two strings without using string library functions


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- 5 Write a program in C to count total number of alphabets, digits and special characters in a string.
- 6 Write a program in C to copy one string to another string
- 7 Write a program in C to count total number of vowel or consonant in a string.
- 8 Write a C program to sort a string array in ascending order.

Module- 5

- 1 What are the structures in C? What is the need of structures?
- 2 What is Union? Give difference between union and structure with examples.
- 3 Explain declaring structure variables and initializing structure variables.
- 4 Explain nested structures with examples.
- 5 Write a note on the following with as example for each:
i) Array of structures ii) Array within structures iii) Structures within structures
- 6 Create a structure st_record having members student Name (Sname) and students marks (Smarks). Write a C program which reads name and marks of two students and compare whether both students are same.(June/July-2018)
- 7 Mention syntax and give an example for the following:
i) Structure definition ii) Structure variable declaration
- 8 Write a program that takes roll numbers, names, and marks of three students in three different subjects as input and prints total marks and percentage of each student
- 9 Write a program that takes book id, author name, publisher name, and price for a book as input and prints the same information as output.
- 10 Write a program in C to create and store information in a text file.
- 11 Write a program in C to read an existing file.
- 12 Write a program in C to read the file and store the lines into an array.
- 13 Write a program in C to Find the Number of Lines in a Text File.
- 14 Write a program in C to count a number of words and characters in a file.
- 15 What is pointer? Explain how to declare a variable as a pointer.
- 16 Write a C program to demonstrate the usage of pointers.
- 17 Write a program to display the value of variable and its location using pointer
- 18 If P is a pointer having address 2000 what could be values for the following:
P=P+2; for int *P;
P=P-1; for float *P;
P=P+10; for char *P;
P=P+1; for double *p;
- 19 Write a program to read two integers M and N and swap the content of two variables M and N using pointers.
- 20 Write a program using pointers in C to print a string in reverse order.

Prepared by	Checked by		
		 9.6.23	
Prof. A. U. Neshti	Prof M.P. Yanagimath	HOD	Principal

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Introduction to python programming

Course Code	BPLCK205B	CIE Marks	50
Course Type	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Total marks(CIE + SEE)	100
Total Hours of Pedagogy	40	SEE Hours	03
Credits	03		

FACULTY DETAILS:

Name: Prof. D. B. Madihalli	Designation: Assistant Professor	Experience: 16 Yrs
No. of times course taught: 01	Specialization: Industrial Electronics	

FACULTY DETAILS:

Name: Smt. Purnima Savadatti	Designation: Asst.Professor	Experience: 07 Years
No. of times course taught: 01	Specialization: Digital Electronics	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	-	-	Basic Mathematics, Logic & Reasoning ability


2.0 Course Objectives

- CLO1:** Learn the syntax and semantics of the Python programming language.
CLO2: Illustrate the process of structuring the data using lists, tuples
CLO3: Appraise the need for working with various documents like Excel, PDF, Word and Others.
CLO4: Demonstrate the use of built-in functions to navigate the file system.
CLO5: Implement the Object Oriented Programming concepts in Python.

3.0 Course Outcomes [C145]

At the end of the course the student will be able to:

CO	Course Outcome	RBT Level	POs
C145.1	Demonstrate proficiency in handling loops and creation of functions.	L1,L2,L3	1,2,3,8,10
C145.2	Identify the methods to create and manipulate lists, tuples and dictionaries.	L1,L2,L3	1,2,3,8,10
C145.3	Develop programs for string processing and file organization.	L1,L2,L3	1, 2, 3,8,10

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C145.4	Interpret the concepts of Object-Oriented Programming as used in Python.	L1,L2,L3	1, 2,3,8,10
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4.0 Course Content

Module-1 (08 Hours)

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, **Flow control:** Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), **Functions:** def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number.

Textbook 1: Chapters 1 – 3

Module-2 (08 Hours)

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References.
Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things.

Textbook 1: Chapters 4 – 5

Module-3 (08 Hours)

Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup.
Reading and Writing Files: Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard.

Textbook 1: Chapters 6 , 8

Module-4 (08 Hours)

Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File,
Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.

Textbook 1: Chapters 9-10

Module-5 (08 Hours)

Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, copying.
Classes and functions: Time, Pure functions, Modifiers, Prototyping versus planning.
Classes and methods: Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation.


Textbook 2: Chapters 15 – 17

Programming Exercises:

1. a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
- b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or

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not.

2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
 b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$. Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ($N \geq 2$) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use `__init__()` method to initialize name, USN and the lists to store marks and total, Use `getMarks()` method to read marks into the list, and `display()` method to display the score card details.]

5.0 Relevance to future subjects

S. No	Semester	Subject	Topics
01	III	Data visualization with python	Charts, graphs, data visualization
02	VI	Machine learning	Model training, charts, analysis

6.0 Relevance to Real World

S. No	Real World Mapping
01	Python is extensively applied in data science, data analysis, machine learning, data engineering, web development, software development, and other fields.

7.0 Gap Analysis and Mitigation

S. No	Delivery Type	Details
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01	E-content	https://www.w3schools.com/python/
02	MOOC	https://nptel.ac.in/courses/106106145

8.0 Books Used and Recommended to Students

Text Books

1. Al Sweigart, "Automate the Boring Stuff with Python", 1st Edition, No Starch Press, 2015.
(Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>) (Chapters 1 to 18, except 12) for lambda functions use this link: <https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015.
(Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

Web links and Video Lectures (e-Resources):

1. <https://www.learnbyexample.org/python>
2. <https://www.learnpython.org/>
3. <https://pythontutor.com/visualize.html#mode=edit>

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References

1. Quizzes for list, tuple, string dictionary slicing operations using below link
<https://github.com/sushantkhara/Data-Structures-And-Algorithms-witt> Python
/raw/main/Python%20%20_%20400%20exercises%20and%20solutions%20for%20beginners.pdf
2. Use <https://pythontutor.com/visualize.html#mode=edit> in order to visualize the python code


10.0 Magazines/Journals Used and Recommended to Students

S.No	Magazines/Journals	website
1	The Python Papers (ISSN: 1834-3147)	https://journals.indexcopernicus.com/search/details?id=782
2	Python Periodicals	https://wiki.python.org/moin/PythonPeriodicals

11.0 Examination Note

Assessment Details (both CIE and SEE)

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The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **25 marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC- 25 Marks

- **CIE IA-Tests: 15 Marks-** Three Tests each of 25 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively and average of best two IA test will be scale down to 15 Marks.
- **CIE-Continuous Comprehensive assessment (CCA)- 10 Marks(1-Quiz- 5M, 1-assignment-5M):**
 - a. Quiz will be conducted for 25M and marks are scaled down to 5M.
 - b. One Assignment with max marks of 25M will be given and marks are scaled down to 5M.

CIE for the practical component of the IC- 25 Marks

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 05 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (duration 03 hours) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 10 marks. Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 25 marks.

The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of 25 marks) in the theory component and 10 (40% of 25marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

4. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
5. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
6. The students have to answer 5 full questions, selecting one full question from each module.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecture	Teaching-Learning Process	% of Portion
		PART - A		
1	L41.	Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types.	Chalk &board, PPT, Animation, Active	20
	L42.	String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program.		
	L43.	Flow control: Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators.		



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	L44.	Elements of Flow Control, Program Execution, Flow Control Statements.	Learning	
	L45.	Importing Modules, Ending a Program Early with sys.exit()		
	L46.	Functions: def Statements with Parameters, Return Values and return Statements, The None Value.		
	L47.	Keyword Arguments and print(), Local and Global Scope, The global Statement.		
	L48.	Exception Handling, A Short Program: Guess the Number.		
2	L49.	Lists: The List Data Type, Working with Lists.	Chalk & board, Active Learning, Problem based learning	20
	L50.	Augmented Assignment Operators, Methods.		
	L51.	Example Program: Magic 8 Ball with a List.		
	L52.	List-like Types: Strings and Tuples, References.		
	L53.	Dictionaries and Structuring Data: The Dictionary Data Type.		
	L54.	Pretty Printing.		
	L55.	Using Data Structures to Model Real-World Things.		
3	L56.	Using Data Structures to Model Real-World Things.	Chalk & board, PPT, Animation, NPTEL, Active Learning	20
	L57.	Manipulating Strings: Working with Strings, Useful String Methods.		
	L58.	Project: Password Locker.		
	L59.	Project: Adding Bullets to Wiki Markup.		
	L60.	Reading and Writing Files: Files and File Paths, The os.path Module.		
	L61.	File Reading/Writing Process, Saving Variables with the shelve Module.		
	L62.	Saving Variables with the print.format() Function.		
	L63.	Project: Generating Random Quiz Files.		
4	L64.	Project: Multiclipboard.	Chalk & board, Problem based learning	20
	L65.	Organizing Files: The shutil Module.		
	L66.	Walking a Directory Tree.		
	L67.	Compressing Files with the zip file Module.		
	L68.	Project: Renaming Files with American-Style Dates to European-Style Dates		
	L69.	Project: Backing Up a Folder into a ZIP File.		
	L70.	Debugging: Raising Exceptions.		
5	L71.	Getting the Traceback as a String, Assertions.	Chalk & board, MOOC	20
	L72.	Logging, IDLE"s Debugger.		
	L73.	Classes and objects: Programmer-defined types, Attributes, Rectangles.		
	L74.	Instances as return values, Objects are mutable, copying.		
	L75.	Classes and functions: Time, Pure functions, Modifiers		
	L76.	Prototyping versus planning.		
	L77.	Classes and methods: Object-oriented features, Printing objects, Another example.		
	L78.	The init method, The __str__ method.		
	L79.	Operator overloading, Type-based dispatch, Polymorphism.		
	L80.	Interface and implementation.		
Practical component				

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First Year Engg.

Academics

Course Plan

AY:2022-23 (Even)

P1.	a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages. b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.	Conduction of Experiments in laboratory and viva-voce	
P2.	a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console. b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).		
P3.	Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.		
P4.	Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.		
P5.	Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]		
P6.	Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].		
P7.	Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods		
P8.	Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp		
P9.	Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.		
P10.	Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]		

13.0 Assignments, Quiz, GD, Mini Project, Seminars

S. No.	Title	Outcome expected	Related Study	Week No.	Individual / Group activity	Reference: book/website /Paper
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1	Assignment-1: Introduction to Computer Hardware & Software. (10Marks)	Students study the Topic and write the Answers.	Chapter-1 of Module-1	4	Individual Activity.	Book 1, 2 of the reference list.
2	Assignment-2: Character Array & Stings including problems. (10Marks)	Students study the Topics and write the Answers.	Chapter-2 of Module-3	9	Individual Activity.	Book 1, 2 of the reference list.
3	Quiz/Seminar/GD (20Marks)	Students study the Topics and answer the Quiz / present seminar.	Will be Notified later.	13	Individual/Group activity.	Book 1, 2 of the reference list.

14.0 QUESTION BANK

Module: 1


1. Explain the math operators in Python from highest to lowest Precedence with an example for each. Write the steps how Python is evaluating the expression $(5 - 1) * ((7 + 1) / (3 - 1))$ and reduces it to a single value.
2. Define a Python function with suitable parameters to generate prime numbers between two integer values. Write a Python program which accepts two integer values m and n (note: $m > 0$, $n > 0$ and $m < n$) as inputs and pass these values to the function. Suitable error messages should be displayed if the conditions for input values are not followed.
3. Explain Local and Global Scope in Python programs. What are local and global variables? How can you force a variable in a function to refer to the global variable?
4. What are Comparison and Boolean operators? List all the Comparison and Boolean operators in Python and explain the use of these operators with suitable examples.
5. Define a Python function with suitable parameters to generate first N Fibonacci numbers. The first two Fibonacci numbers are 0 and 1 and the Fibonacci sequence is defined as a function F as $F_n = F_{n-1} + F_{n-2}$. Write a Python program which accepts a value for N (where $N > 0$) as input and pass this value to the function. Display suitable error message if the condition for input value is not followed.
6. What is Exception Handling? How exceptions are handled in Python? Write a Python program with exception handling code to solve divide-by-zero error situation.
7. List the salient features of python programming language.
8. What are the different flow control statements supports in python .Explain any 3 withan suitable example program and flow chart.
9. Write a python program to calculate the area of circle, rectangular and triangle. printthe results.
10. What is a function? How to define a function in python? Write a program using function to find out the given string is palindrome or not.
11. What is local and global scope of variable in python .Explain the different scenarios with an example snippet.
12. Write a python program to create a function called collatz() which reads as parameter named number. If the number is even it should print and return $number//2$ and if the number is odd then it should print and return $3*number+1$. The function should keep calling on that number until the function returns a value 1.

Module -2

1. What is Dictionary in Python? How is it different from List data type? Explain how a For loop can be used to traverse the keys of the

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Dictionary with an example.


2. Explain the methods of List data type in Python for the following operations with suitable code snippets for each.
 - (i) Adding values to a list
 - (ii) Removing values from a list
 - (iii) Finding a value in a list
 - (iv) Sorting the values in a list
3. Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters.
4. What is the difference between `copy.copy()` and `copy.deepcopy()` functions applicable to a List or Dictionary in Python? Give suitable examples for each.
5. Discuss the following Dictionary methods in Python with examples. (i) `get()` (ii) `items()` (iii) `keys()` (iv) `values()`
6. Explain the various string methods for the following operations with examples.
 - (i) Removing whitespace characters from the beginning, end or both sides of a string.
 - To right-justify, left-justify, and center a string.
7. What is list? Explain the concept of slicing and indexing with proper examples.
8. For a given list `num=[45,22,14,65,97,72]`, write a python program to replace all the integers divisible by 3 with "ppp" and all integers divisible by 5 with "qqq" and replace all the integers divisible by both 3 and 5 with "pppqqq" and display the output.
9. What are the different methods supports in python List. Illustrate all the methods with an example.
10. What is dictionary? Illustrate with an example python program the usage of nested dictionary.
11. List out all the useful string methods which supports in python. Explain with an example for each method.
12. What are the different steps in project Adding Bullets to Wiki Markup.

Module- 3

1. Write a Python Program to find an American phone number (example: 415-555-4242) in a given string using Regular Expressions.
2. Describe the difference between Python `os` and `os.path` modules. Also, discuss the following methods of `os` module (a) `chdir()` (b) `rmdir()` (c) `walk()` (d) `listdir()` (e) `getcwd()`
3. Demonstrate the copy, move, rename and delete functions of `shutil` module with Python code snippet.
7. Describe the following with suitable Python code snippet.
 - (i) Greedy and Non Greedy Pattern Matching
 - `findall()` method of Regex object.
8. Explain the file Reading/Writing process with suitable Python Program.
9. Define assertions. What does an assert statement in python consists of? Explain how assertions can be used in traffic light simulation with Python code snippet.
10. What are regular expression? What are the different steps to be follow to use a regular expression in python.
11. List out what are the different character classes and its representation also regular expression symbol and its meaning.
12. Write a python program to create phone number and email address by using regular expression.
13. What are the key properties of a file? Explain in detail file reading/writing process with an example of python program.
14. Explain in briefly, What are the different methods of file operations supports in python `shutil` module.
15. Write a python program to create a folder PYTHON and under the hierarchy 3 files file1, file2 and file3. write the content in file1 as "VTU" and in file2 as "UNIVERSITY" and file3 content should be by opening and merge of file1 and file2. Check out the necessary condition before write file3.

Module- 4


1. Define classes and objects in Python. Create a class called Employee and initialize it with employee id and name. Design methods to:
 - (i) `setAge_to` assign age to employee.

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- (ii) setSalary_ to assign salary to the employee.
 Display_ to display all information of the employee.
- Illustrate the concept of **modifier** with Python code. Explain **init** and **__str__** method with an example Python Program.
 - Define polymorphism? Demonstrate polymorphism with function to find histogram to count the number of times each letter appears in a word and in a sentence.
 - Illustrate the concept of **pure** function with Python code.
 - Define Class Diagram. Discuss the need for representing class relationships using Class Diagram with suitable example.
 - What is a class? How to define class in python? How to initiate a class and how the class members are accessed?
 - Explain init and str method with an example python program.
 - Write a python program that uses datetime module within a class, takes a birthday as input and prints the age and the number of days, hours, minutes and second.
 - What is a pure function? Illustrate with an example python program
 - Define polymorphism. Demonstrate polymorphism with function to find histogram to count the numbers of times each letters appears in a word and in sentence.
 - What is type based dispatch? Illustrate with python program.

Module- 5


- Explain the process of downloading files from the Web with the **requests** module and also saving downloaded files to the hard drive with suitable example program.
- Write a note on the following by demonstrating with code snippet.
 - Opening Excel documents with **openpyxl**.
 - Getting Sheets from the Workbook.
 - Getting Cells, Rows and Columns from the Sheets.
- Describe the getText() function used for getting full text from a .docx file with example code.
- Explain how to retrieve a web page element from a **BeautifulSoup** Object by calling the **select** method and passing a string of a CSS selector for the element you are looking for with an example program.
- What is JSON? Briefly explain the **json** module of Python. Demonstrate with a Python program.
- Discuss the Creation, Encryption and Decryption of a PDF.
- What is web scraping? how to download files from web, check the error and save the downloaded files to hard drive with request module in python.
- Explain in details how to parse HTML with the Beautiful Soup.
- How to work with Excel spreadsheet in python. Explain briefly.
- How to work with PDF document in python. Explain with extracting text, decrypting, creating copying pages, encrypting PDF.s
- What is CSV and JSON files? Explain with an example program the usage of json module in python.

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15.0 University Result

Examination	S+	S	A	B	C	D	E	F	% Passing
-	-	-	-	-	-	-	-	-	-

Prepared by	Checked by		
Prof. D. B. Madihalli	Prof. P. V. Patil	HOD	Principal

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Professional Writing Skills in English			
Subject Code	BPWSK206	CIE Marks: IA-Tests(20) + Assignments(10)+	50
Teaching Hours/Week (L:T:P:S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	02 Hours/Week	Total marks (CIE + SEE)	100
Credits	02	SEE Hours	02

FACULTY DETAILS:		
Name: Prof. B. S. Hooli	Designation: Lecturer	Experience: 20 Yrs
No. of times course taught: 2	Specialization: English	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	-	-	Basic English Skills

2.0 Course Objectives


The course (BPWSK206) will enable the students,

- To Identify the Common Errors in Writing and Speaking of English.
- To Achieve better Technical writing and Presentation skills for employment.
- To read Technical proposals properly and make them to Write good technical reports.
- Acquire Employment and Workplace communication skills.
- To learn about Techniques of Information Transfer through presentation indifferent level.

3.0 Course Outcomes

At the end of the course (BPWSK206) the student will be able:

CO	Course Outcome	Cognitive Level	POs
C112.1	To understand and identify the Common Errors in Writing and Speaking.	L1,L2	1,2,3,8,10
C112.2	To Achieve better Technical writing and Presentation skills.	L1,L2,L3	1,2,3,8,10
C112.3	To read Technical proposals properly and make them to Write good technical reports.	L1,L2,L3	1, 2, 3,8,10

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C112.4	Acquire Employment and Workplace communication skills.	L1,L2,L3	1, 2,3,8,10
C112.5	To learn about Techniques of Information Transfer through presentation in different level.	L1,L2,L3	1, 2,3,8,10

4.0 Course Content

Module-1

Identifying Common Errors in Writing and Speaking English:

- Advanced English Grammar for Professionals with exercises, Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules with Exercises).
- Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused.

Module -2

Nature and Style of sensible writing:

- Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarising and Paraphrasing.
- Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés.

Module- 3

Technical Reading and Writing Practices:

- Reading Process and Reading Strategies, Introduction to Technical writing process,
- Understanding of writing process, Effective Technical Reading and Writing Practices ,Introduction to Technical Reports writing, Significance of Reports, Types of Reports.
- Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process.
- Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.

Module- 4

Professional Communication for Employment:

- The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener.
- Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.
- Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.


Module-5

Professional Communication at Workplace:

- Group Discussions – Importance, Characteristics, Strategies of a Group Discussions. Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics,

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Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. Non- Verbal Communication Skills (Body Language) and its importance in GD and PI/JI/EI.

- Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).

5.0 Suggested Learning Resources

Text Books
<ol style="list-style-type: none"> 1. A Course in Technical English, Cambridge University Press – 2020. 2. Functional English (As per AICTE 2018 Model Curriculum) Cengage learning India Pvt Limited [Latest Revised Edition] - 2020. 3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018. 4. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021. 5. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017. 6. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015. 7. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018. 8. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

6.0 Examination Note

Assessment Details (both CIE and SEE):

Continuous internal evaluation (CIE) needs to be conducted for 50 marks like Engineering courses. The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% of maximum marks in CIE and 35% of maximum marks in SEE to pass. MCQ Pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE) :

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

All the tests are preferred similar to SEE pattern; however, the teacher may follow test pattern similar to other theory courses of Engineering.


Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester.
5. Second assignment at the end of 9th week of the semester.

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs

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and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper will be set for 100 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 120 minutes. Marks scored are scaled down to 50 Marks. (Time duration may be made 90 minutes to train the students for engineering / non-engineering competitive examination)

- Professional Writing Skills in English has become a very important component in all engineering and non-engineering competitive examinations. In exams like GRE, TOEFL, IELTS and GATE exam, all state and Central Government recruitment examinations, placement tests and other Examinations, so the pattern of question paper, in general, will be in multiple-choice question (MCQ) Pattern. So, to meet the relevance of the recruitment requirement of our Engineering students "Professional writing skill in English" Semester end examination (SEE) will be conducted in a multiple choice question (MCQ) pattern.
- MCQ Pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration).

7.0 Course Delivery Plan

Module	Lecture No.	Content of Lecture		% of Portion
		PART - A	Teaching-Learning Process	
1	1	Advanced English Grammar for Professionals with exercises	Chalk & board, PPT, Animation, Active Learning	20
	2	Common errors identification in parts of Speech		
	3	Use of verbs and phrasal verbs, Auxiliary verbs and their forms		
	4	Subject Verb Agreement (Concord Rules with Exercises)		
	5	Common errors in Subject-verb agreement, Noun pronoun agreement, Sequence of Tenses and errors identification in Tenses.		
	6	Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused.		
2	7	Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion.		20



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	8	Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication	Chalk & board, Active Learning, Problem based learning	
	9	Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarising and Paraphrasing.		
	10	Misplaced modifiers, Contractions, Collocations, Word Order		
	11	Errors due to the Confusion of words		
	12	Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Cliches.		
3	13	Reading Process and Reading Strategies, Introduction to Technical writing process.	Chalk & board, PPT, Animation, NPTEL, Active Learning	20
	14	Understanding of writing process, Effective Technical Reading and Writing Practices		
	15	Introduction to Technical Reports writing, Significance of Reports, Types of Reports.		
	16	Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process.		
	17	Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech.		
	18	Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.		
4	19	The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers.	Chalk& board, Problem based learning	20
	20	Improving Listening Skills. Attributes of a good and poor listener.		
	21	Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.		
	22	Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters.		
	23	Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment		
	24	Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.		
5	25	Group Discussions – Importance, Characteristics, Strategies of a Group Discussions.	Chalk& board, Problem based learning	20
	26	Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews.		

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	27	Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills		
	28	Non-Verbal Communication Skills (Body Language) and its importance in GD and PI/II/EI.		
	29	Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills.		
	30	Dialogues in Various Situations (Activity based Practical Sessions in class by Students).		

Second Semester - BE/B.Tech
Professional Writing Skills in English
 [Common to all Programmes] Course Code: **BPWSK206**
Model Question Paper

Examination: **One Hour**

Maximu

m Marks: **50** **Instructions to the candidates**

- i) Answer all the 50 questions, each question carries one mark.
- ii) Marking/darkening two circles for the same question makes the answer invalid.

1. Professional writing demands _____ use of language.
 - a) figurative
 - b) poetic
 - c) factual**
 - d) dramatic

2. Which of these has maximum reach in professional writing?
 - a) Writing**
 - b) Listening
 - c) Speaking
 - d) Talking

3. Which of these must be avoided in professional writing?
 - a) Facts
 - b) Grammar
 - c) Punctuation
 - d) Personal feelings**

4. Which of these words is used in professional writing?
 - a) Apex**
 - b) Top
 - c) Slanting

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Bottom

5. Familiar words must be used in professional writing.

- a) **True**
- b) False

6. Which of these do not deal with precise information in professional writing?

- a) Engineer
- b) Scientist
- c) Technician
- d) **Fiction writer**

7. In an office, an employee communicates horizontally with his _____ in professional writing.

- a) superiors
- b) subordinates
- c) **colleagues**
- d) assistant

8. Talking comes under which type of communication in professional writing?

- a) **Verbal**
- b) Non- verbal
- c) Written
- d) Dramatic

9. Professional writing is same as general writing.

- a) True
- b) **False**

10. How is good professional writing achieved?

- a) Naturally
- b) **By practice**
- c) Listening
- d) Speaking

11. Which of these parameters are not required to define style in professional writing?

- a) Moral truth
- b) Compassion
- c) **Gender**
- d) Information

12. Any style must convey moral truth.

- a) True
- b) **False**

13. Any writer must convey truth with warmth.

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- a) **True**
 b) False

14. A writer must not convey information with _____

- a) precision
 b) **clarity**
 c) randomness
 d) truth

15. Which of these are to be avoided in any style of writing?

- a) Truth
 b) Clarity
 c) Compassion
 d) **Dishonesty**

Directions (Q. No. 16-20) : In questions , sentences are given with blanks to be filled in with an appropriate word (s). Four alternatives are suggested for each question. Choose the correct alternatives out of the four:

16. The Chairman is ill and we'll have to the meeting for a few days.

- a) put on
 b) put of
 c) put away
 d) **put off**

17. The cat and the dog have a enemy in the rat.

- a) same
 b) common
 c) mutual
 d) **similar**

18. He told me that he..... watching the movie.

- a) is finished
 b) was finished
 c) **had finished**
 d) not finished

19. He is very good..... making stories.

- a) in
 b) about
 c) **at**
 d) for

20. I do my work carefully to make mistakes.

- a) so
 b) **very**
 c) too
 d) more

Directions (Q. Nos. 21-25) : In questions choose the word opposite in meaning to the given word :

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21. Plausible
 a) implausible
 b) unplausible
c) implausible
 d) displausible
22. Frailty
 a) energy
 b) intensity
 c) vehemence
d) strength
23. Genial
 a) stupid
 b) stingy
 c) boorish
d) unkind
24. Prevent
 a) protect
 b) block
 c) hinder
d) induce
25. Demolish
 a) shift
b) build
 c) repeat
 d) hide
26. Majority of staff members were not satisfied with the new director. (Which word is a compound noun?)
 A. director **B. staff members** C. new D. majority
27. When we were going up the hill, we have seen an old castle. (Which word is an abstract noun?)
A. hill B. seen C. we D. **old**
28. Alice's father is a surgeon, he mostly does not have time to spend with his family.
 (Which word is a singular possessive noun?) A. surgeon B. time C. family
D. Alice's father
29. Australian government will bring together anti-terror laws. (Which word is a nominative noun?)
 A. bring **B. Australian** C. anti-terror D. government
30. They discussed the problems, but could not find the solution. (Which word is a non count noun?)
 A. could not B. find **C. solution** D. discussed

Directions : (Q.Nos. 31-35) : Out of the four alternatives, choose the one which best express the meaning of the word :

31. Defer
 a) Indifferent



b) Defy

c) Differ

d) Postpone

32. Abandon

a) Forsake

b) Keep

c) Cherish

d) Enlarge

33. Cease

a) Begin

b) Stop

c) Create

d) Dull

34. Cancel

a) Abolish

b) Approve

c) Allow

d) Break

35. Pious

a) Religious

b) Sympathetic

c) Afraid

d) Faithful

Directions : In the following questions, some parts have been jumbled up. You are required to rearrange these parts, which are labeled P, Q, R and S, to produce the correct sentence.

36. In life, some rules are/ (P), as business/ (Q), they seem almost instinctive/ (R), learnt so early that/ (S)

a) R S P Q

b) Q P S R

c) R P S Q

d) Q S P R

37. All precautionary measures were taken, to prevent the capture of booths/ (P), during the election/ (Q), by the Government/ (R), by the terrorists (S)

a) S P R Q

b) Q S P R

c) R P S Q

d) R Q S P

38. Kapil, left in an aeroplane / (P), after reading a sailing magazine/ (Q), had decided/ (R), to build his own boat nine years earlier/ (S)

a) P R Q S

b) R S Q P

c) R Q P S

d) P S R Q

39. Each culture, flourishes when it comes/ (P), own tradition and dyet/ (Q), draws strength from its/ (R), into contact with others/ (S)

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a) R Q P S

b) S P Q R

c) R P Q S

d) S Q P R

40. The concept of death, that it has been reduced/ (P), as an inevitability/ (Q), is so ancient/ (R), to a cliché/ (S)

a) S P R Q

b) Q R P S

c) S R P Q

d) Q P R S

41. Women, are more likely to give birth prematurely/ (P), and their babies are at increased risk/ (Q), who are poorly nourished or sick/ (R), of death and disability/ (S)

a) R Q S P

b) R P Q S

c) Q S P R

d) Q S R P

42. Today, in the country/ (P), offers the best connectivity, both/ (Q), Kerala, among all states/ (R), in terms of telecommunication/ (S)

a) R P Q S

b) S Q P R

c) R Q P S

d) S P Q R

Directions : In each of the following questions a word is followed by four options. You have to choose the option that is the most appropriate synonym to the given word.

43. Foment

A) Vex

b) Waste

c) Renounce

d) Instigate

44. Placate

a) Rouse

b) Harass

c) Pacify

d) Rejoice

45. Solicitous

a) Obscene

b) Wise

c) Wholesome

d) Confident

46. Adulation

a) Approval

b) Extension

c) Applause



d) Greeting

47. Sordid

a) Harmful

b) Dirty

c) Splendid

d) Dangerous

48. Debunk

a) Expose

b) Cheat

c) Threaten

d) Pacify

Directions: In the following questions Choose the option which is an improvement upon the italicized part of the sentence. If no important is required, your answer is (d).

49. All the allegation leveled against him were found to be baseless.

a) leveled for

b) level with

c) level against

d) no improvement

50. People are tiring very soon in an activity which they don't like.

a) tried

b) trying

c) tired

d) no improvement

51. To which of these people is the report not very crucial?

a) Engineers

b) Scientists

c) Teachers

d) Business executives

52. A technical report establishes a _____

a) illogical conclusion

b) logical conclusion

c) personal prejudice

d) misplaced learning

53. Which of these must never be a basis for a technical report?

a) Facts

b) Tests

c) Personal prejudices

d) Experiments

54. Which of these must be avoided in a technical report?

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- a) Facts
- b) Logical conclusion
- c) Objective evaluation
- d) Subjective evaluation**

55. Which of these is not a parameter in a report?

- a) Extent of information
- b) Quality of information
- c) Age of writer**
- d) Ability to acquire information

56. Which of the following is one of the fundamental ____ of efficient and effective writing is to put the main important information at the start.

- (A) Case Example
- (B) Principle**
- (C) Situation

57. Which one is used for the Shortest document among technical written documents?

- (A) report
- (B) website
- (C) summary**
- (D) paragraph

58. We must be avoided _____ in technical writing?

- (A) Facts
- (B) Grammar
- (C) Punctuation
- (D) Personal feelings**

59. The 7C's apply to which of the following communication?

- (A) Only oral communication
- (B) Only written communication
- (C) Both written and oral communications**
- (D) None of these


60. All of the following are true of extemporaneous speaking except which of the following?

- (A) It emphasizes audience interaction over exact wording.
- (B) It includes speaking from key words instead of speaking or reading from**

61. the Indian industry.

- a) opinion
- b) existence**
- c) status
- d) maturity

62. Authority ____ when it is not supported by the moral purity of its user.

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a) waits

b) crumbles

c) empowers

d) prevails

63. A formal letter should be _____to have the desired effect on the recipient.

a) In a proper

b)

c) Grammatically Correct

d) Relevant

e) All of these

64. What would you write in the opening part of a formal letter?

a) Asking about health

b) Asking about family

c) Informing the purpose of writing the letter

d) None

65. The key point of a formal letter is written in which part of a formal letter?

a) Introduction

b) Heading

c) Subject

d) Body

66. How to end the main body of a formal letter?

(A) By showing your love for the recipient.

(B) By discussing the weather in your city.

(C) By discussing the weather in the recipient's city.

(D) By telling the recipient what he should be doing next.

67. What would you write in the opening part of a formal letter?

(A) Ask about the well-being of the recipient.

(B) Inform the recipient about the purpose of writing the letter.

(C) Discuss about the recipient's family.

(D) File complaint about the problems in your life.

Choose the correct verb/ tense form from the options given to complete the gap.


68. Our Holy Books tell us that man -----mortal. (A) is (B) was (C) will be (D) are

69. The teacher asked the boys whether they -----the problems.

(A) solve (B) **have solved** (C) had solved (D) solves

Directions: Some parts of the sentences have errors and some are correct. Find out which part of a sentence has an error:

70. Ram was (a)/ senior to (b)/ Sam in college.(c)/ **No error** (d)


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71. **Supposing if** (a)/ it rains (b)/ what shall we do? (c)/ No error (d)
72. The capital of Yemen (a)/ **is situating** (b)/ 2190 meters above the sea level. (c)/ No error (d)
73. It was him (a)/ who came running (b)/ into the classroom. (c)/ **No error** (d)

B.S.Hooli	HOD	Principal

Subject Title	Course Title: INDIAN CONSTITUTION		
Subject Code	BICO207	SEE Marks	50
Number of Lecture Hrs / Week	01	CIE Marks	50
Total Number of Lecture Hrs	15	Exam Hours	02
CREDITS – 01			

FACULTY DETAILS:		
Name: Prof. M. S. Futane	Designation: Asst. Prof.	Experience: 17Years
No. of times course taught: 1	Specialization: CIM	

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		Academics
		Course Plan
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1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Mechanical Engg.		

2.0 Course Objectives

At the end of the course students will be able to:

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

3.0 Course Outcomes

After study of the course, the students are able to

	Course Outcome	Cognitive Level	POs
CO1	Analyse the basic structure of Indian Constitution.	U	1, 5
CO2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.	U	1, 5
CO3	know about our Union Government, political structure & codes, procedures.	U	1, 5
CO4	Understand our State Executive & Elections system of India.	U	1, 5
CO5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution	U	1, 5
Total Hours of instruction			50

4.0 Course Content

Course syllabus


Module-1

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly..

Module-2

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building. **Module-3**

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

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Module-4

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

Module-5

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

5.0 Books Used and Recommended to Students

Text Books
1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.
Reference Books
1. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
3. "Samvidhana Odu" - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice –Hall, 2004.

6.0 Examination Note

Internal Assessment: 50 Marks

7.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
1	1	The Necessity of the Constitution, The Societies before and after the Constitution adoption.	20
	2	Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly	
	3	Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations.	
2	4	Directive Principles of State Policy (DPSP) and its present relevance in our society with examples.	20
	5	Fundamental Duties and its Scope and significance in Nation building.	
	6	Parliamentary System, Federal System, Centre-State Relations.	
3	7	Union Executive – President, Prime Minister, Union Cabinet, Parliament	20
	8	LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism	
	9	State Executives – Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts,	
4	10	Special Provisions (Articles 370,371,371J) for some States.	20
	11	Elections, Electoral Process, and Election Commission of India, Election Laws.	
	12	Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments.	

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Module – IV:

- The Fundamental rights are contained in _____ part of the Constitution
 a. I b. II c. III d. IV
- The Fundamental rights are classified into _____
 a. 5 groups b. 6 groups c. 7 groups d. 8 groups
- The provisions of Article 14 does not apply to
 a. President & Governor c. Chief-minister & Governor
 b. Prime-minister & Chief-ministers d. President & Prime-minister.
- Article 15 applies to
 a. Citizens only b. Aliens only c. both a & b d. None of these .
- Article 19 gives us ___ freedoms
 a. 4 b. 5 c. 6 d. 7
- Article 32 refers to
 a. Right against exploitation c. Cultural & Educational rights
 b. Right to Equality d. Right to Constitutional remedies
- Which of the following has been dropped from the List of fundamental rights?
 a. Right to liberty b. Right to Property c. Right to Religion d. Right against Exploitation.
- Which Article of the constitution guarantees the Right to life and personal liberty?
 a. 20 b. 21 c. 22 d. 23
- Which Article of the Constitution has been described as the very soul of the Constitution and the very heart of it?
 a. 32 b. 19 c. 21 d. 21A
- Cultural and Educational rights are contained in Articles?
 a. 25-26 b. 27-28 c. 29-30 d. 73-74

Module – V:

- The Directive Principles of state policy aim at
 a. Establishing a free society b. Establishing a genuine political democracy.
 c. Establishing social, economic base for democracy d. All of the above.
- The Constitution makers have taken the idea of Directive Principles from the Constitution of
 a. Ireland b. America c. Britain d. Canada.
- The Enforcement of the Directive Principles depends upon
 a. People b. Judiciary c. Opposition Party d. Ruling Party.
- Who has aptly described the Directive Principles of State policy as a "Novel Feature" of the Constitution of India
 a. L.M.Singhvi b. Motilal Nehru c. N.Madhava Rao d. Dr.B.R.Ambedkar
- Which directive Principle has not been enforced till now?
 a. Belief in Peace c. Protection of Animals
 b. Free Education upto certain classes d. Enforcement of prohibition.
- Which is not a Directive Principle of State Policy?
 a. Participation of workers in the management of industries
 b. Organization of agriculture and Animal Husbandry
 c. Uniform Civil Code for all the citizens
 d. Abolition of titles.

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		Academics
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M. S Futane	HOD	Principal
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Subject Title	Scientific Foundation of Health		
Subject Code	BSFHK208	CIE Marks	50
Number of Lecture Hrs / Week	2 hrs	SEE Marks	50
Total Number of Lecture Hrs	15	Exam Hours	01
CREDITS – 01			

FACULTY DETAILS:		
Name: Dr. M.S. Hanagadakar	Designation: Associate Professor	Experience: 18.5Years
Name: Dr. Shashikant Walki	Designation: Assistant Professor	Experience: 06 .5Years
No. of times course taught: 04		Specialization: Chemistry

1.0 Prerequisite Subjects:			
Sl. No	Branch	Semester	Subject
01	<u>Basic Knowledge about chemistry and biology</u>	I	Chemistry and Biology

Nidasoshi-591 236, Tq.: Hukkeri, Dist.: Belagavi, Karnataka, India.
 Phone: +91-8333-278887, Fax: 278886, Web: www.hsit.ac.in, E-mail: principal@hsit.ac.in

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2.0 Course Objectives

- To know about Health and wellness (and its Beliefs)
- To acquire Good Health & It's balance for positive mind-set
- To Build the healthy lifestyles for good health for their better future
- To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
- To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset

3.0 2. Course Outcomes

At the end of the course the student will be able :

CO'S	Course Outcome	Cognitive Level	POs
CO	To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.	L1 and L2	PO1, PO2, PO3, PO6, PO7, PO12
CO	To Build the healthy lifestyles for good health for their better future.	L1 and L2	PO1, PO2, PO3, PO6, PO7, PO12
CO	To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.	L1 and L2	PO1, PO2, PO3, PO6, PO7, PO12
CO	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future	L1 and L2	PO1, PO2, PO3, PO6, PO7, PO12
CO	To Prevent and fight against harmful diseases for good health through positive mindset	L1 and L2	PO1, PO2, PO3, PO6, PO7, PO12
Total Hours of instruction			15

4.0 Course Content

Module-1

Good Health and It's balance for positive mindset:

Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module-2


Building of healthy lifestyles for better future:

Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Module-3

Creation of Healthy and caring relationships :

Building communication skills, Friends and friendship - Education, the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.

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Module-4

Avoiding risks and harmful habits:

Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.

Module-5

Preventing and fighting against diseases for good health:

How to protect from different types of infections, How to reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.

5.0 Relevance to future subjects

A short guide to help students pursuing technical courses, to know importance of health and benefits of being in good health.

6.0 Relevance to Real World

SL.No	Real World Mapping
01	Understand and apply the Fundamentals of Health.
02	inculcate and develop the healthy lifestyle habits for good health

7.0 Gap Analysis and Mitigation


To facilitate communication between students, researchers, public health practitioners, Health awareness is important for all to lead life happily in the world

8.0 Books Used and Recommended to Students

Suggested Books
<ol style="list-style-type: none"> 1. "Scientific Foundations of Health" – Study Material Prepared by Dr. L Thimmesha, Published in VTU University Website. 2. "Scientific Foundations of Health", (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022. 3. Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.
Additional Study material & e-Books
<ol style="list-style-type: none"> 1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017. 2. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, 3. McGraw Hill Education (India) Private Limited - Open University Press. 4. SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes. 5. Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

9.0 Relevant Websites (Reputed Universities and Others) for Notes /Animation / Videos Recommended

Website and Internet Contents References
SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes

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10.0 Magazines/Journals Used and Recommended to Students

11.0 Examination Note

Assessment Details (both CIE and SEE)

methods of CIE need to be defined topic wise i.e.- Tests, MCQ, Quizzes, Seminar or micro project/Course Project, Term Paper)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 35% of maximum marks in SEE and a minimum of 40% of maximum marks in CIE. Semester End Exam (SEE) is conducted for 50 marks (1hours' duration) .. Based on this grading will be awarded.

The student has to score a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **25 Marks (duration 01 hour)**

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

(All tests are similar to the SEE pattern i.e question paper pattern is MCQ)

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**


CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for subject SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hours**

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
1	1	Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health,	Chalk and talk method, Videos, Power Point presentation		20%
	2	Health & Behavior, Health & Society, Health & family, Health & Personality	Creating real time stations in classroom		


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	3	Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.	discussions, (Connecting Campus & community with companies real time situations).		
2	4	Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health,	Chalk and talk method, Videos, Power Point presentation and Animation videos to teach phonetics in Practical method, creating real time stations in classroom	https://www.englishclub.com/pronunciation/phonemic-chart-ia.htm	20%
	5	Obesity & overweight disorders and its management, Eating disorders,			
	6	Fitness components for health, Wellness and physical function, How to avoid exercise injuries.			
3	7	Creation of Healthy and caring relationships : Building communication skills, Friends and friendship .	Chalk and talk method, Videos, Power Point presentation and Animation videos to teach phonetics in Practical method, creating real time stations in classroom		20%
	8	Education, the value of relationship and communication skills, Relationships for Better or worsening of life,			
	9	understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.			
4	10	Avoiding risks and harmful habits : Characteristics of health compromising behaviors	Chalk and talk method, PowerPoint presentation to teach Grammar and phonetics, Animation videos on communication and language skills		20%
	11	Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions,			
	12	Differences between addictive people and non addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.			
5	13	Preventing & fighting against diseases for good health: How to protect from different types of infections, How to reduce risks for good health,	Chalk and talk method, PowerPoint presentation to teach Grammar and phonetics, Animation videos on communication and language skills		20%
	14	Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life,			
	15	Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.			

13.0

QUESTION BANK

- Which of these is not a definition of health?
 - Health as not ill
 - Health despite disease
 - Health means not seeing a doctor
 - Health as vitality
- Which of these things is health psychology concerned with?
 - What causes illness?
 - Who is responsible for illness?
 - How should illness be treated?
 - All of the above
- Which of these is not an example of a health behaviour?
 - Smoking
 - Taking regular exercise

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determinants of health within the community.

- a) Behaviour change approach b) Community development approach
 c) Biomedical approach d) None of these
23. Which of the following is a criticism of the behaviour change approach to health promotion?
 a) It is unable to target the major causes of ill health.
 b) The choice of which behaviour to target lies with 'experts' whose task it is to communicate and justify this choice to the public.
 c) The behaviour change paradigm does not address the many variables other than cognitions that influence human actions.
 d) All of these
24. _____ refers to the application of consumer-oriented marketing techniques in the design, implementation and evaluation of programmes aimed towards influencing behaviour change
 a) Health education b) Social marketing
 c) Consumer health d) None of these
25. When can we say that we are not healthy?
 a) When we feel good physically
 b) When we are able to cope well with the social pressure
 c) When we have a positive outlook towards life
 d) When we constantly suffer from headaches due to a stressful life
26. The term 'health' is defined in many ways. The most accurate definition of the health would be *
 a) Health is a state of body and mind in a balanced condition
 b) Health is a reflection of a smiling face
 c) Health is a state of complete physical, mental and social well-being
 d) Health is a symbol of economic prosperity
27. Which of the following is not dimension of health?
 a) Nutrition b) Physical c) Social d) Mental
30. ICDS stands for
 a) Integrated child development scheme b) Indian child development scheme
 c) Integrating child development scheme d) None of these
31. The top priority of Janani Suraksha Yojana is
 a) Decrease the fertility rate b) Reduce the birth rate
 c) Reduction of MMR d) None of these
32. In which year NRHM was launched in India?
 a) 2005 b) 2008 c) 2004 d) 2007
33. NRHM covers
 a) Improve accessibility to quality health care for the rural population
 b) Bridge gaps in health care
 c) facilitate decentralized planning in the health sector d) All of the above
34. NHRM seeks to strengthen
 a) Private healthcare system b) Public and private health care system
 c) Public health care system d) None of these
35. NFHS stands for
 a) National full health status b) National family health survey
 c) National family health status d) None of these
36. National Population Policy of India was introduced in which year?
 a) 2001 b) 2005 c) 2012 d) 2000
37. As per WHO the principles of health is
 a) Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
 b) The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.
 c) The health of all peoples is fundamental to the attainment of peace and security and is dependent on the fullest cooperation of individuals and States.
 d) All of the above


38. The importance of good health in a person's life
 - a) To serve himself, nation, and community
 - b) To save the cost of treatment and the hassle of going to hospitals
 - c) To feel comfortable and happy
 - d) All of the above
39. Which of the following is not a benefit of living healthy? *
 - a) Feel Better About Yourself
 - b) High levels of stress
 - c) Avoid Addictions
 - d) Lower Medical Costs
40. How one can achieve good health and well-being? *
 - a) Drink a lot of water
 - b) Add more fruits and vegetables to your diet
 - c) Protect your skin
 - d) All of the above
41. What influences our health?
 - a) Economic environment
 - b) Cultural environment
 - c) Both
 - d) None
42. Which are the factors that impact health?
 - a) Air, water, and soil quality
 - b) Racism, sexism, political participation
 - c) Diet, exercise, and addictions
 - d) All of the above
43. Which is not the category of health behavior?
 - a) Preventive health behavior
 - b) Easy-going behaviour
 - c) Illness behavior
 - d) Sick-role behavior
44. A child buckled into a safety seat is participating in
 - a) Health-related behaviour
 - b) Health-directed behaviour
 - c) Both
 - d) None
45. Self-care behavior includes
 - a) The actions such as eating chicken soup, drinking liquids, or taking over-the-counter medications for cold or flu-like symptoms
 - b) The use of alternative and complementary medical treatments, without medical supervision
 - c) Treating minor injuries such as bruises, scrapes, and twisted ankles when a person does not think a health care professional is needed
 - d) All of the above
46. Which of these is not a definition of health?
 - a) Health as not ill
 - b) Health despite disease
 - c) Health means not seeing a doctor
 - d) Health as vitality
47. Which of these is not an example of a health behaviour?
 - a) Smoking
 - b) Taking regular exercise
 - c) Eating healthy food
 - d) Going to the gym
48. Which of these is not an element of the Health Belief Model?
 - a) Threat
 - b) Expectations
 - c) Cure
 - d) Socio-demographic factors
49. What does the term 'mortality' refer to?
 - a) Death
 - b) Illness
 - c) Health
 - d) Morbidity
50. is a physical response
 - a) Habit
 - b) Emotions
 - c) Feelings
 - d) Thinking

14.0 University Result

Examination	S ⁺	S	A	B	C	D	E	F	% Passing

Prepared by

Checked by

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